pp. 917-1012] October, 1952

TROPICAL DISEASES BULLETIN

VOL. 49] 1952 [No. 10

MAIN CONTENTS

	PAGES		PAGES
Summary of Recent Abstracts. VIII. Typhus Group of Fevers ...	917–923	Leprosy	961–969
Malaria	923–935	Helminthiasis	970–986
Trypanosomiasis	935–938	Deficiency Diseases ...	987–989
Fevers of the Typhus Group	938–943	Sprue	989–992
Yellow Fever	943–944	Haematology	992
Dengue and Allied Fevers...	944	Venoms and Antivenenes...	992–993
Rabies	945–947	Dermatology and Fungus Diseases	994–996
Plague	947–949	Miscellaneous Diseases ...	996–998
Cholera	949–952	Protozoology : General ...	998–1000
Amoebiasis and Intestinal Protozoal Infections ...	952–957	Entomology and Insecticides : General	1001–1011
Relapsing Fever and Other Spirochaetoses	957–959	Reports, Surveys and Miscellaneous Papers	1011
Yaws	959–961	Book Review	1011–1012

For detailed Contents see pp. ii, iv, vi, viii, x, xii and xiv.

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1
(Telephone: MUSEUM 3041)

COMMONWEALTH MYCOLOGICAL
28 NOV 1952

Entered as Second Class Matter in the U.S.A. Post.

HONORARY MANAGING COMMITTEE

APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES

Chairman : E. D. Pridie, *C.M.G., D.S.O., O.B.E.*, M.B., B.S.
(*Chief Medical Officer, Colonial Office*)

Professor Patrick A. Buxton, *C.M.G.*, M.A., M.R.C.S., L.R.C.P., D.T.M. & H., F.R.S.
(*representing the Royal Society*)

Sir John Charles, M.D., F.R.C.P., D.P.H.
(*representing the Ministry of Health*)

Lieut.-General Sir James Bennett Hance, *K.C.I.E., O.B.E.*, M.D., F.R.C.S.Ed., I.M.S. (retd.)

Sir Harold P. Himsworth, *K.C.B.*, M.D., F.R.C.P. (*representing the Medical Research Council*)

Sir Wilson Jameson, *G.B.E., K.C.B.*, M.D., F.R.C.P.

Professor G. Macdonald, M.D., M.R.C.P., D.P.H., D.T.M.

Sir Philip Manson-Bahr, *C.M.G., D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

E. R. A. Merewether, *C.B.E.*, M.D., F.R.C.P., F.R.S.Ed.

Brigadier G. S. Parkinson, *C.B.E., D.S.O.*, M.R.C.S., L.R.C.P., D.P.H., Late R.A.M.C.

J. B. Sidebotham, *C.M.G.*, M.A. (*of the Colonial Office*)

Andrew Topping, M.A., M.D., F.R.C.P., D.P.H.

Secretary : F. Farmer (*of the Colonial Office*)

STAFF OF THE BUREAU :

Charles Wilcocks, *C.M.G.*, M.D., F.R.C.P., D.T.M. & H., *Director*
H. J. O'D. Burke-Gaffney, *O.B.E.*, M.D., *Assistant Director*
R. L. Sheppard, *O.B.E.*, *Secretary*

Alice D. Crump — Jean A. Houslip
Doris H. C. Hamilton — J. W. Priestley
Joan E. D'Arcy Hart — Delphine A. Sowman
Sheila D. Widra

LIST OF ABSTRACTERS IN THIS ISSUE

A. R. D. Adams, M.D., F.R.C.P., D.T.M.
D. J. Bauer, M.B., B.Chir., Ph.D.
D. S. Bertram, B.Sc., Ph.D.
J. H. Birkinshaw, D.Sc., F.R.I.C.
Professor J. J. C. Buckley, D.Sc.
H. J. O'D. Burke-Gaffney, *O.B.E.*, M.D.
J. Cauchi, M.D., D.P.H.
C. C. Chesterman, *O.B.E.*, M.D., M.R.C.P., D.T.M. & H.
Maj.-Gen. Sir G. Covell, *C.I.E.*, M.D., D.P.H., D.T.M. & H., I.M.S. (retd.)
Professor M. E. Delafield, *M.C.*, M.B., B.Ch., D.P.H.
C. C. Draper, B.A., D.M., B.Ch., D.P.H., D.T.M. & H.
J. T. Duncan, F.R.C.S., L.R.C.P. (Ire.), D.T.M. & H.
Thomas E. Fletcher, B.Sc.
J. D. Fulton, M.A., B.Sc., Ph.D., M.B., Ch.B., D.T.M.
Professor P. C. C. Garnham, M.D., D.Sc., M.R.C.S., L.R.C.P., D.P.H.
A. J. P. Goodchild, B.Sc.
C. J. Hackett, M.D., Ph.D., F.R.C.P., D.T.M. & H.
Lieut.-Col. W. L. Harnett, *C.I.E.*, M.A., M.D., F.R.C.P., I.M.S. (retd.)
Miss C. M. Harrison, B.Sc., Ph.D.
F. Hawking, D.M., D.T.M.
E. Hindle, M.A., Sc.D., Ph.D., F.R.S.
C. A. Hoare, D.Sc., F.R.S.
G. Lapage, M.D., M.Sc.
H. S. Leeson, F.R.E.S.
H. Lehmann, Ph.D., M.D., F.R.I.C.
Professor G. Macdonald, M.D., M.R.C.P., D.P.H., D.T.M.
Professor B. G. Maegraith, M.A., M.B., B.S., B.Sc., D.Phil., M.R.C.P.
Sir Philip Manson-Bahr, *C.M.G., D.S.O.*, M.D., F.R.C.P., D.T.M. & H.
Maj.-Gen. Sir John W. D. Megaw, *K.C.I.E.*, D.Sc., M.B., B.Ch., I.M.S. (retd.)
Ernest Muir, *C.M.G., C.I.E.*, M.D., F.R.C.S. Ed.
Miss R. Nash, B.Sc.
T. E. Osmond, B.A., M.B.
Lieut.-Col. R. Passmore, M.A., D.M., I.M.S. (retd.)
Sir H. Harold Scott, *K.C.M.G.*, M.D., F.R.C.P., D.P.H., D.T.M. & H.
Maj.-Gen. Sir John Taylor, *C.I.E., D.S.O.*, M.D., D.P.H., I.M.S. (retd.)
R. Ford Tredre, M.D., B. Hy., D.P.H., D.T.M. & H.
F. Norman White, *C.I.E.*, M.D., D.P.H., I.M.S. (retd.)
Charles Wilcocks, *C.M.G.*, M.D., F.R.C.P., D.T.M. & H.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 49] 1952 [No. 10

SUMMARY OF RECENT ABSTRACTS*

VIII. TYPHUS GROUP OF FEVERS

General

Considerable interest has recently been taken in the rickettsial diseases of Africa, and comprehensive surveys have been prepared by FREYCHE and DEUTSCHMAN (p. 138) for WHO, and jointly by a study group of WHO and OIHP (p. 351). GIROUD and JADIN (p. 727) and JADIN (p. 879) show that in the Belgian Congo the louse-borne and murine forms occur, and also boutonneuse fever and Q fever, the last having been responsible for a considerable outbreak in a people living in close association with cattle. These authors contend that mite-borne typhus exists there, and quote as evidence a small series of positive complement-fixation tests and the not infrequent positive tests with *Proteus OXK*. In comment Megaw suggests that the strain of *Proteus OXK* may have had unusual antigenic properties. NINARD (p. 245) has examined the *Proteus OX19* titre of pregnant women in Morocco. It is positive at 1 in 80 in a high proportion of them, but this titre is not regarded as specific.

WOYCIECHOWSKA (p. 723) describes a method for staining rickettsiae, for details of which the original abstract should be consulted.

FELIX (p. 26) has proposed that standard antisera should be prepared from horses for standardization of agglutinating suspensions of *Proteus OX19, OXK* and *OX2*, and this proposal has been accepted by the World Health Organization. He sets out the advantages which the Weil-Felix test possesses over the rickettsia-agglutination and complement-fixation tests in relation to the various fevers of the typhus group, and points out that the Weil-Felix test remains the only one available for routine purposes, and that the rickettsial antigens supplement rather than supplant the *Proteus OX* antigens. Reactions with *Proteus* should not be considered non-specific in relation to rickettsiae. MEYER (p. 245) also discusses the standardization of materials for this test, and states that by using phenolized saline solutions, errors could be greatly reduced.

SCHUBERT *et al.* (p. 624) have evaluated the sensitivity and specificity of several complement-fixation techniques for rickettsial diseases. With one exception all were reliable if two or more tests were carried out at suitable

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1951, v. 48. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

intervals. The authors discourage the prevalent idea that a diagnosis can safely be based on the result of a single test at " diagnostic titre ". COOMBS and STOKER (p. 886) have devised a highly sensitive rickettsia-agglutination test by which very small quantities of agglutinating antigen can be detected.

KUMAGAI (p. 974) uses a test in which a homologous antigen is added to serum of the patient and incubated for 2 hours. Addition of acid then produces greater turbidity than with control serum. This may be positive on the third day of illness, before the Weil-Felix and complement-fixation tests have become positive. With appropriate antigens murine and louse-borne typhus can be differentiated.

HORRENBERGER and ROUBERT (p. 353) report on electrophoretic changes in the serum of rabbits during induced rickettsial pneumonia.

BLATTNER (p. 980) summarizes recent advances in the treatment of rickettsial diseases. JACKSON and SMADEL (p. 795) found no evidence to suggest that ACTH or cortisone would be useful in rickettsial infections.

Proteus OX19 type : Vectors louse and flea
Louse typhus

An account of the epidemic in Barcelona in 1942–43 is given by BORELL (p. 1098), and BUCCO (p. 1099) refers to the epidemic in Naples in 1943–44, when cases of serous meningitis, probably due to reaction to allergic " shock ", were observed. A case probably due to inhalation of infected dust is described by KAETHER and BECKER (p. 795). The incubation period is calculated by D'IGNAZIO and CODELEONCINI (p. 139) as about 18 days.

SPÄT (p. 536) claims to have cultivated *Rickettsia prowazeki*, from cerebrospinal fluid, in a cell-free fluid medium. MURRAY and SNYDER (p. 536) show that rickettsiae from patients with Brill's disease were identical with *R. prowazeki*, and antigenically different from *R. mooseri*. It is unlikely that *R. mooseri* can be transformed into *R. prowazeki* when transmitted by human lice. The most active fraction of *R. prowazeki* in complement-fixation tests was found by MIKULASZEK and WOJCIECHOWSKI (p. 1099) to be the nucleoprotein fraction.

KRYŃSKÍ and WOYCIECHOWSKA (p. 723) have investigated in lice the action of methylene blue on *R. prowazeki*, and GIROUD *et al.* (p. 1098) the effect of intradermal injection of typhus rickettsiae and the virus of pneumonitis of guineapigs, alone or together, in guineapigs and rabbits.

In a series of cases of typhus in Warsaw the Weil-Felix test was positive at 1 in 200 in only 59·28 per cent., and at 1 in 100 in 9·28 per cent. in addition. The rickettsia-agglutination test was positive at 1 in 100 in 97·85 per cent., and the results of the complement-fixation test were in general line with these. WOJCIECHOWSKI (p. 725) concludes that the Weil-Felix test is not reliable [but see FELIX, above].

For typhus, D'IGNAZIO and BENETAZZO (p. 353) advocate treatment with chloramphenicol by mouth, 3 gm. during the first two hours, followed by doses of 0·5 gm. every 4 hours until the end of the period for which the fever would have been expected to last if specific treatment had not been given. The natural duration of the untreated disease is estimated as 14–15 days.

Intrarectal introduction of aureomycin into lice can either suppress or eliminate recent infection with *R. prowazeki* (PRZESMYCKI *et al.*, p. 244).

A description of the technique now used in Poland in preparing typhus vaccine by the method of Weigl is given by KRYŃSKÍ (p. 724), and RADKOWIAK (p. 724) describes the technique of louse inoculation. CHAMBERS *et al.* (p. 246) report studies on commercial typhus vaccines and various rickettsial fractions. Details should be sought in the original. DAVIS (p. 537) shows that the Craigie vaccine gave some protection to persons attending the sick in the concentration

camp in Belsen ; it shortened the duration and lessened the severity of the illness in those who contracted typhus after having received it.

HORRENBERGER (p. 354) finds that the Durand-Giroud vaccine, after some early diminution of activity, retains a considerable degree of protective value for a long time, if kept at 6°C. DURAND (p. 538) reports the experiments made some years ago which demonstrated the value of the xanthate vaccine (killed) for typhus, which was more effective than the live vaccines previously used. It has the drawback that its potency declines after 2–3 weeks at room temperature. This, and the formolized vaccine, have been used in Tunisia on a large scale.

A simple and rapid method of testing the potency of typhus vaccines is described by KITAOKA and SHISHIDO (p. 624).

Flea typhus

SCAFFIDI (p. 1057) has written a book on typhus of murine origin.

TENDEIRO (p. 881) in Portuguese Guinea studied 11 strains of *R. mooseri*, finding complete cross-immunity with a murine strain from Casablanca.

Human typhus of murine origin is reported by BAIRD and TONKIN (p. 883) from Uganda, where it occurs sporadically. GISPEN *et al.* (p. 795) have isolated a murine strain from a patient in Java, and GISPEN and WARSA (p. 975) from rats and pools of *Xenopsylla cheopis* there. They failed to isolate rickettsiae from shrews, rat lice and ticks. The strains were homogeneous with an American murine strain and the strain from the patient. The rickettsia of murine typhus has been found in the mite *Schöngastia indica* from rats in Indonesia,and although no experimental transmission by this mite has been demonstrated, GISPEN (pp. 140, 539) thinks that it may play an important part in transmission from rat to rat.

MOHR (p. 883) has defined the distribution of *Xenopsylla cheopis* in the United States.

In a monograph issued by the Department of Public Health, California (p. 974) on flea-borne typhus it is shown that complement-fixation tests have been found positive there in *R. norvegicus*, *R. rattus*, *R. alexandrinus* and *Mus musculus*, but not in ground squirrels.

In Florida positive complement-fixation tests for murine typhus (at titre 1 in 8) were found by RICKARD (p. 726) in 3·6 per cent. of a group of sera submitted for premarital tests for syphilis. There is some evidence that the titre falls with lapse of time, but 32 months later the changes were slight. In work on rats and cotton rats infected with murine typhus the same author (p. 726) has found that the complement-fixation test is the most accurate for detecting past infection (almost 100 per cent. positive), the rickettsia-agglutination test next, and the Weil-Felix test the least accurate. A complement-fixation titre of 1 in 8 is significant in rats, but over 1 in 64 is needed for certainty in cotton rats. Similar work is reported by RICKARD and WORTH (p. 976).

WORTH and RICKARD (p. 881) show that the mite *Liponyssus* [*Bdellonyssus*] *bacoti* is a potential (though inefficient) vector of murine typhus in rats. They (p. 882) have shown that the urine of infected rats is not itself infectious. Rats may become infected by eating diseased rats, but infection through fighting and cannibalism is probably not common in natural conditions.

FOX (p. 247) found *Rhipicephalus sanguineus* on a few rats in Porto Rico, though rats had not previously been regarded as hosts of these ticks there. They probably do not play any significant part in transmission of murine typhus. He (p. 625) considers that *Xenopsylla cheopis* and *Ornithodorus puertoricensis* (particularly the former) meet the requirements for vectors there more than the other ectoparasites.

WERTMAN and SARANDRIA (p. 726) have performed tests with rats which suggest that complement-fixing murine typhus antibodies are not formed so

well in rats deficient in vitamins as in normal rats, but the difference is not marked.

RICKARD (p. 882) kept rat-flea faeces containing murine rickettsiae at room temperature, and found, unlike other authors, that the rickettsiae were dead 96 hours later. Further work is needed on this subject. KITAOKA and SHISHIDO (p. 973), on the other hand, found that dried louse faeces infected with *R. mooseri* remained infective for over 250 days at room temperature, but not so long at −20°C. Similar results were obtained with dried louse faeces containing *R. prowazeki*.

HILL *et al.* (p. 976) show that the Florida campaign of dusting rat harbourages with DDT effected a great reduction in flea infestation and in the incidence of typhus in the rats. The mite *L. bacoti* was not effectively controlled, and the rat louse *Polyplax spinulosus* was not significantly reduced in numbers.

Proteus OXK type : Vector mite

AUDY and HARRISON (p. 546) give an account of scrub typhus and the work done on it by two British units in Burma and Malaya. KHAN (p. 354) reports 400 cases of scrub typhus seen in two years at a steel-works settlement in India. Incidence rose sharply each year two months after the onset of the rainy season. The Weil-Felix test with *Proteus OXK* was positive at 1 in 250 in 86 per cent. of patients tested in the third week. Aureomycin was given in a number of cases, with great success. No survey of epidemiological conditions is reported.

HAYASHI (p. 883) has isolated *R. orientalis* from field voles (*Apodemus speciosa*) in the foot-hills of Mount Fuji, Japan, where mite-borne typhus has occurred in American troops. These voles have not previously been incriminated.

JONES (p. 27) describes the feeding mechanism of larval *Trombicula*, which is the same with *T. autumnalis* and the mites concerned in transmission of scrub typhus.

In experiments on immunity in scrub typhus SMADEL *et al.* (p. 355) have found that although lasting immunity may arise against a homologous strain, there may be little or none persisting for one or two years against a heterologous strain, and there are pronounced antigenic differences between strains.

Dramatically successful treatment of scrub typhus with chloramphenicol is recorded by FARINAUD *et al.* (p. 247).

In work on human volunteers SMADEL *et al.* (p. 977) show that if chemoprophylaxis with chloramphenicol is to be effective against scrub typhus, it must be continued until immunity develops. They noticed that rickettsiae were present in the blood in the second or third weeks after infection of nearly all the persons who received suppressive treatment.

JACKSON and SMADEL (p. 978) describe the preparation of a lyophilized living vaccine for scrub typhus.

Indeterminate type : Vector tick

Tick typhus has been reported from Italy by PIZZILLO (p. 1102) and from Cyrenaica by BARTONE (p. 28). In the Belgian Congo boutonneuse fever is recorded by MOREAU (p. 140), and GIROUD (p. 244) concludes that the so-called "Congolese red fever" is probably boutonneuse fever; LE GAC and ROUBY (p. 540) classify the tick-borne typhus fevers of Africa as boutonneuse fever. The study group of WHO and OIHP (p. 351) agree that the name Congolese red fever has no justification.

MILLER (p. 355) shows that Rocky Mountain spotted fever has occurred on Long Island, New York, for many years, and it is presumed that the tick

Dermacentor variabilis is the vector. Infestation has been completely controlled by spraying the sides of paths and roads with 5 per cent. DDT.

PARKER *et al.* (p. 796) isolated strains of *Rickettsia rickettsi* of low virulence from rabbit ticks (*Haemaphysalis leporis-palustris*), and these strains immunized against Rocky Mountain fever, maculatum fever, boutonneuse fever and S. African tick-bite fever. No virulent strain has ever been isolated from *H. leporis-palustris*, which does not usually bite man, but may be important in maintaining *R. rickettsi* among wild rabbits. All stages of *D. andersoni* are also found on rabbits, and these are the ticks concerned in transmission to man in the western United States. The first identified case of Rocky Mountain fever in Panama is reported by DE RODANICHE and RODANICHE (p. 28). It is noted that for the complement-fixation test there is little difference between the antigens of rickettsialpox and Rocky Mountain fever, a point which is also made by FELIX (p. 26) [see also *Rickettsialpox*, below].

A monograph on the epidemiology of the severe form of tick-borne typhus of São Paulo (and of murine typhus in the same area) has been written by PASCALE (p. 540). DE MAGALHÃES (p. 29) has isolated strains of rickettsiae from ticks, mainly *Amblyomma cajennense*, in Brazil. He also claims that the disease may be transmitted by bed-bugs. DE MAGALHÃES and ROCHA (p. 541) have investigated the Weil-Felix and complement-fixation tests in the typhus fevers of Brazil. They note that the tick-borne type occurs in a mild as well as in a severe form. PEREIRA *et al.* (p. 979) report false positive complement-fixation tests in dogs in Rio de Janeiro, when unpurified antigens were used.

In tick-borne typhus favourable reports have been given of chloramphenicol (PARKER *et al.*, p. 540), aureomycin (LE GAC and ROUBY, p. 540 ; DE MAGALHÃES *et al.*, p. 728), and terramycin (POWELL *et al.*, p. 979 ; BAUER *et al.*, p. 979 ; DE MAGALHÃES *et al.*, p. 728).

Q fever

A general account of the history of Q fever has been written by SIDKY (p. 29).

The disease is widespread ; it has been reported from England (MARMION and STOKER, p. 248 ; HARVEY, p. 542 ; CAMERON, p. 797) ; France (DECOURT *et al.*, p. 728) ; Portugal (FONSECA *et al.*, p. 980) ; Germany (HENGEL *et al.*, p. 249) ; Switzerland (BRACHER, p. 250 ; BURGDORFER *et al.*, p. 542) ; Italy (PENATI and RANDONE, p. 543 ; BABUDIERI, p. 798 ; DEL TURCO *et al.*, p. 799 ; SIMONDI *et al.*, p. 799 ; RIDI *et al.*, p. 799 ; SICUTERI, p. 799 ; VALLI (San Marino), p. 884) ; Turkey (TITIZ and ERKIP, p. 30 ; GOLEM, p. 884) ; French Equatorial Africa (GIROUD *et al.*, pp. 626, 980) ; Belgian Congo (JADIN and GIROUD, pp. 543, 885) ; S. Africa (SANER and FEHLER, p. 356) ; China (Peking) (CHANG *et al.*, p. 729) ; S. Australia (STOKES, p. 356) ; United States (LENNETTE and CLARK, p. 543) and Mexico (SILVA GOYTIA, p. 356).

The British cases occurred on farms, or in students at a college in Canterbury, or in persons who attended a post-mortem examination on a man who died of the disease. [The same occurred in Italy (BABUDIERI, p. 798).] There was ample evidence of its existence in people and cattle of the district where two outbreaks originated. A laboratory infection is reported by CALERO (pp. 729, 801). FONSECA *et al.* (p. 980) think that most Portuguese cases arise from drinking infected milk, though tick transmission occurs in animals, and in Germany HENGEL *et al.* (p. 249) have found *R. burneti* in unfed *Ixodes ricinus* from a dog, and in cows' milk.

Contact with animals is usual. In Switzerland patients had worked with animals for slaughter, in conditions favourable to the formation of dust. In Italy several outbreaks have been associated with inhalation of dust contaminated by excreta of sheep, goats or cattle, and positive results to the

complement-fixation test have been found in these animals in Florence. Even pigeons have been suspected. Similar positive tests in man and domestic animals have been found in Turkey, French Equatorial Africa and in Mexico.

Infection probably due to inhalation of infected dust is reported from California, usually in people associated with sheep or goats, rarely with cattle (LENNETTE and CLARK, p. 543) ; and DELAY *et al.* (p. 140) have isolated *R. burneti* from dust-laden air in places occupied by sheep or cattle there.

R. burneti was isolated from cows' milk, goats and ticks (*Haemaphysalis leachi*) in the Belgian Congo where a severe form of the disease was seen (JADIN and GIROUD, pp. 543, 885).

GIROUD and JADIN (pp. 543, 885) found that *Ornithodorus moubata* fed on infected guineapigs harboured the infection for at least 4 months, and BURGDORFER *et al.* (pp. 542, 800) have used this tick for diagnosis, examining it some time after it has been allowed to feed on suspected animals or man.

GIROUD and JADIN (p. 545) found evidence that lice, collected in an area where Q fever had occurred, harboured *R. burneti*. In later work GIROUD *et al.* (p. 1101) showed that the faeces of lice fed on infected animals were infective 3 days after the meal. This fact may be important in the spread of Q fever.

WEYER (p. 250) sums up the transmission of Q fever, showing that the rickettsia can multiply in every species of tick yet tried, and in fleas, bed-bugs and lice, and that susceptible warm-blooded animals can transmit the disease by sputum, milk or urine, even if these have been dried and converted into dust.

In cattle the infection, like brucellosis, tends to be localized in the uterus, placenta or mammary gland ; young animals are relatively resistant (STOENNER, p. 626).

Strains of *R. burneti* have been studied from outbreaks in England (STOKER, p. 249) and Australia (STOKES, p. 356) ; the latter were closely related to the Henzerling strain. A fully virulent strain was isolated by RECZKO (p. 544) from a guineapig inoculated 526 days previously.

RANSOM and HUEBNER (p. 545) have found *R. burneti* more resistant than *R. mooseri* and other rickettsiae to heat, formalin and phenol. HERZBERG and URBACH (p. 885) show that there were great differences between German and Mediterranean strains of *R. burneti* used in complement-fixation tests, and emphasize the importance of standardization of antigens and techniques.

HERZBERG *et al.* (p. 544) show that intratesticular inoculation of guineapigs with suspected material can sometimes give early diagnosis of Q fever.

The hypersensitivity test to Q fever antigen was positive in a large proportion of persons handling cattle, and in butchers, in Oubangui-Chari (GIROUD *et al.*, p. 980). MIRRI (p. 251) has used an allergic test for Q fever in animals, which apparently gives clear-cut results.

Infiltration of the lung was found by LAUR and RABENSCHLAG (p. 729) in 20 per cent. of cases of Q fever. Physical signs were often absent. The condition often persisted when convalescence was fully established.

CLARK *et al.* (p. 626) used aureomycin by mouth, intravenously and intramuscularly in Q fever in California, with good results, though some strains of the rickettsiae were resistant and there were some unpleasant effects.

Treatment with aureomycin failed to eliminate Q fever from infected cattle (LUOTO *et al.*, p. 546).

Terramycin has a powerful inhibitory action on rickettsial organisms and SMADEL *et al.* (p. 978) think that it will probably be a very effective drug, especially in Q fever.

To control Q fever in California HUEBNER and BELL (p. 545) suggest pasteurization of milk and vaccination, but effective control will not be possible until the disease can be eradicated from domestic animals. In England,

however, MARMION *et al.* (p. 1100) have studied the effect of pasteurization on milk infected with *R. burneti*. With the H.T.S.T. process naturally-infected milk was no longer infective to guineapigs after 15 seconds at 154°–156°F., but artificially infected milk was consistently infective after treatment at 158°–159°F., or possibly 160°–161°F. In some experiments phosphatase-negative milk was still infective. With the holder process heavily infected milk exposed to 143·5°–148°F. for 30 minutes was no longer infective. *R. burneti* seems to be rather more resistant to heat than the tubercle bacillus, and the current H.T.S.T. process does not offer as wide a margin of safety against Q fever as against tuberculosis.

PAYZIN (p. 30) found some evidence of protective value in experimental work on Q fever vaccines, and suggests their use in persons exposed to the disease.

Rickettsialpox

A case of rickettsialpox is reported from Boston by PIKE *et al.* (p. 546). The complement-fixation reactions with antigens of rickettsialpox and Rocky Mountain spotted fever were positive in equal degree ; the *Proteus* reactions were very weak or negative. A second case is reported by FRANKLIN *et al.* (p. 625).

A laboratory infection (without the primary lesion seen in natural infections) is reported by SLEISENGER *et al.* (p. 728). The reaction with the antigen of Rocky Mountain spotted fever was the same as that with the antigen of rickettsialpox [see also *Indeterminate type : Vector tick* (Rocky Mountain fever) above].

Aureomycin appears to be strikingly successful in rickettsialpox (ROSE *et al.*, p. 547). ROSE (p. 978) has found terramycin effective in man and animals.

Charles Wilcocks

MALARIA

GLORIEUX, E. Un cas de malaria congénitale en Belgique. [**A Case of Congenital Malaria in Belgium**] *Ann. Soc. Belge de Méd. Trop.* 1952, Apr. 30, v. 32, No. 2, 203–5.

QUINBY, G. E. & WELCH, Sarah F. **Progress Report of Epidemiologic Appraisal of Reported Malaria in the United States during 1949 and 1950.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 495–9.

" (1) Within the areas covered by the appraisal program during 1949 and 1950, 86 positives were found ; 23 of these are regarded as primaries, only 5 of which are unquestioned.

" (*a*) For 1949, 60 positives were discovered ; of these, 17 are regarded as primaries, only 3 of which are unquestioned.

" (*b*) For 1950, 26 positives were found ; of these, 6 are regarded as primaries, only 2 of which are unquestioned.

" (2) The coverage of the appraisal program in time and area is not sufficiently extensive to constitute a complete measurement of incidence in the nation or in the 13 eradication states.

" (3) The lack of association between cases within the eradication states studied indicates very little malaria transmission."

See also p. 1001, DAKSHINAMURTY & SHARMA, **The Humidity Preferences of Mosquitoes ; The Temperature Preferences of Mosquitoes.**

VENKAT RAO, V. **A Brief Note on the Breeding Habits of *A. sundaicus* in the Chilka Lake Area.** *Indian J. Malariology.* 1951, June, v. 5, No. 2, 163–4.

It is recorded that in experiments and field observations in the Chilka Lake area over a period of years, no *Anopheles sundaicus* were found breeding in running waters; they bred only in standing water (fresh or saline) with abundant aquatic vegetation. A method is described for the treatment of fresh-water tanks and borrowpits whereby breeding of *A. sundaicus* was reduced to a negligible amount by combining a slow current in drainage ditches, and complete drying periodically in the tanks and pits to reduce the growth of vegetation. The method has been successful for 3 years in the Chilka Lake area, where the malaria-carrying form of *A. sundaicus* is thought to occur mainly in fresh water. *D. S. Bertram*

OMORI, N. & SAKAKIBARA, M. **Considerations on the Recent Decline, in the Numbers of an Anopheline Mosquito, *Anopheles hyrcanus* var. *sinensis* Wiedemann, in the so-called Sabae District of Fukui Prefecture.** *Kitasato Arch. Exper. Med.* 1952, Mar., v. 24, Nos. 3/4, 425–8. [Also in Japanese, with 10 refs.]

By a comparison of figures recorded by earlier workers, with those resulting from their own investigations, the authors illustrate the parallel which exists between the decline in the annual number of malaria cases, and the reduction in population of the local vector, *Anopheles hyrcanus* var. *sinensis*, as a percentage of the total mosquitoes caught. In 1940, there were nearly 3,000 malaria cases, and the vector mosquito made up between 30 and 50 per cent. of the mosquito population found in houses, whereas in 1949 only 23 cases of malaria were recorded, and less than 20 per cent. of the mosquitoes in houses were *A. hyrcanus* var. *sinensis*. *A. J. P. Goodchild*

ARCH. INST. PASTEUR D'ALGÉRIE. 1952, Mar., v. 30, No. 1, 107–9, 3 figs. Technique de la recherche de l'indice sporozoïtique pour l'étude épidémiologique du paludisme. [**Technique for Determining the Sporozoite Index for use in the Epidemiological Study of Malaria**] (Tract No. 71. Oct. 1951.)

A description of the Sergents' method of examination of anopheline salivary glands for sporozoites.

RAMAKRISHNAN, S. P., YOUNG, M. D., JEFFERY, G. M., BURGESS, R. W. & MCLENDON, S. B. **The Effect of Single and Multiple Doses of Paludrine upon *Plasmodium falciparum*.** *Amer. J. Hyg.* 1952, Mar., v. 55, No. 2, 239–45, 1 fig.

The inhibitory effect of proguanil on the sexual forms of *Plasmodium falciparum* in the mosquito was demonstrated by MACKERRAS and ERCOLE and by SHUTE and MARYON [this *Bulletin*, 1948, v. 45, 305; 578]. The present study was undertaken in order to discover whether a single dose of 300 mgm. of the drug, either with or without the subsequent administration of 100 mgm. weekly, would prevent mosquito transmission. The subjects of the experiment were Negroes suffering from neurosyphilis. Two strains of *P. falciparum* were used, one from Panama, the other from South Carolina. A single dose of 300 mgm. proguanil was given during the primary or subsequent asexual parasite waves, when most of the patients were experiencing clinical attacks. After administration of the drug, mosquitoes (*Anopheles quadrimaculatus*, *A. maculipennis freeborni* and *A. albimanus*) were allowed to bite the patients,

preferably at daily intervals. In most cases fever and demonstrable parasitaemia disappeared within 3 days, but reappeared in 15 out of 18 cases in 11 to 23 days. Gametocyte production was not diminished. The gametocytes were rendered non-infective to mosquitoes for 2 to 6 days, after which they were able to complete their cycle in the insect host. After it had been established that a single 300 mgm. dose of proguanil would not adequately sterilize the infection, some of the patients were given 100 mgm. once weekly, starting one week after the initial 300 mgm. dose. During the first few weeks mosquitoes fed on these patients were able on various occasions to acquire and transmit malaria, after which they no longer became infected. It is concluded that a community under such a régime would not be adequately protected against transmission of the two strains of *P. falciparum* used in the experiment. *G. Covell*

See also p. 943, Roth, **Loci of Sensory End-Organs used by Mosquitoes (*Aedes aegypti* (L) and *Anopheles quadrimaculatus* Say) in receiving Host Stimuli.**

Sergent, Ed. Des inconvenients et de l'avantage des infections latentes. [**Advantages and Disadvantages of Latent Infections**] *Riv. di Parassit.* Rome. 1952, Jan., v. 13, No. 1, 115–22.

The state of latent or metacritical infection is defined as the condition of the host after the combat with the parasite has ended, when the disease is over and the infective agent has withdrawn into hiding. The agent in this sense is a living organism always invisible to the naked eye and living in the tissues rather than the tracts of the host, and includes bacteria, protozoa, spirochaetes, fungi, rickettsiae and viruses. Sometimes the infection becomes established without battle ; the term "*latence d'emblée*" is then employed but the final condition is the same. The latent state persists for long periods, for 2 or 3 years or more in relapsing fever (hispanicum type), for 6 years in canaries infected with *Plasmodium relictum* or for life in anaplasmosis. Animals in this state possess the special type of immunity known as premunition which is essentially dependent upon the continual presence in the body of the antigen, in contrast to true immunity where the antigen is permanently destroyed. In the case of *P. relictum*, the presence of antigen is best demonstrated by inoculating the total volume of the infected canary into a new bird.

Possession of a latent infection is of value to the individual because, although liable to occasional exacerbations or relapses, he is immune to superinfection with the same strain of parasite. Vaccination has even been recommended in certain circumstances, *e.g.*, for babies against malaria in tropical countries, the ideal being to produce a *latence d'emblée* (as the author managed to effect in 30 per cent. of canaries vaccinated with specially treated sporozoites of *P. relictum*). But to the community, latent infection must constitute a danger in the form of a hidden reservoir of disease, and protective vaccination has only a value if infective (*e.g.*, sexual) forms of the parasite can be suppressed. The author managed to do this in the case of *Theileria dispar* by repeated blood passage of the organism. *P. C. C. Garnham*

Wahi, P. N. & Arora, M. M. **Liver Function Studies in Malaria—I.** *Indian J. Med. Sci.* 1952, Mar., v. 6, No. 3, 165–76, 1 chart & 1 fig.

Liver " function " tests were carried out in 50 acute and 60 chronic cases of malaria (species of parasite not stated). Chronic malaria was diagnosed " on the basis of a positive clinical history and by exclusion of other important causes of liver derangement, specially cirrhosis ". Biopsies were done in some of the chronic cases.

Thymol turbidity and flocculation, colloidal gold, cephalin cholesterol flocculation, and bromsulphthalein retention tests, together with estimation of total serum bilirubin, total and fractional plasma proteins and urinary urobilinogen, were carried out in certain groups of patients.

Ten per cent. of cases showed no deviation from normal. The remainder had one or more tests positive. The flocculation and bromsulphthalein tests gave abnormal results in the majority of acute cases.

The authors found that neither the species of infecting parasite nor the duration of the acute attack appeared to determine the nature or extent of the abnormal findings.

A brief summary of the literature is given. *B. G. Maegraith*

WAHI, P. N. & ARORA, M. M. **Liver Function Studies in Malaria—II.** *Indian J. Med. Sci.* 1952, Apr., v. 6, No. 4, 235–45, 1 fig. & 1 chart. [52 refs.]

This is the second part of a study of liver function in malaria [see above, (1952) p. 925] the first article was concerned with the disease in the acute stage, the paper under review deals with 60 cases of chronic relapsing malaria.

The thymol turbidity test showed abnormal results in 40 of 60 patients (66 per cent.); thymol flocculation gave similar results. The colloidal gold test was positive in 51 (85 per cent.) and the cephalin cholesterol flocculation test in 57 patients (95 per cent.).

In 54 cases (90 per cent.) there was an increase in bromsulphthalein retention time; they were examined 30 minutes after intravenous injection of 5 mgm./kgm. body weight.

Serum bilirubin was abnormally raised in only 19 patients, *i.e.*, in 32 per cent. [and not as stated by the authors 13·6 per cent.] of the series.

In 40 patients the serum protein was examined, nearly all (38) had an albumin level below the minimum normal, in eight (20 per cent.) the albumin concentration was below 2 gm. per cent., *i.e.*, at a level at which hypoproteinaemic oedema can be expected. There was a slight increase in the serum globulin associated with hypo-albuminaemia in 31 patients (78 per cent.), this resulted in 17 cases (43 per cent.) in a reversed albumin : globulin ratio.

Lastly prothrombin activity and its response to vitamin K were measured in 43 patients. The prothrombin time was below 50 per cent. of normal in 35 cases (81 per cent.) and when vitamin K was injected did not rise by more than 20 per cent. of the initial value in 28 patients [*i.e.*, in 65 per cent. and not 56 per cent. as stated in Table 17].

The authors conclude that "in the majority of patients, during acute and chronic phases of acquired malaria, standard liver function tests show some degree of deviation from normal". Only one of the 60 chronic patients studied had given normal results in all the tests.

[There is a reservation one would like to make as regards this valuable study; it concerns a point to which the authors themselves refer in the discussion of their results. Proof of liver dysfunction in chronic malaria was found most frequently in serum flocculation tests. These all depend on alteration in the gamma-globulin level, and are directly connected with the function of the reticulo-endothelial cells, the lymph glands and the spleen, *i.e.*, the cells and the organs which produce gamma-globulin. The flocculation tests are empirically known to give positive results when there is hepatic damage. But one wonders whether it is justified to assume that there is liver disease if flocculation tests are positive in chronic malaria patients in whom one would expect involvement of reticulo-endothelial cells and spleen in any case.

Similarly could the low plasma-albumin level not be caused by the malnutrition usual in a chronic disorder and be an expression of general debility rather than of liver damage ?]

There are 52 references, some of them referring to the first part of the study.

H. Lehmann

BORN, W. C. Malaria und Diabetes mellitus. [**Malaria and Diabetes**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 503–7. [20 refs.]

The English summary appended to the paper is as follows :—

" Pathological changes of pancreas tissue by malarial toxins have been reported. Review of literature proves that causal connections of malaria and diabetes are possible but extremely rare. This opinion has some bearings on pension claims of diabetics. Claims are justified only when the onset of diabetes coincides with malarial infection and glycosuria decreases under specific malarial treatment."

WINCKEL, C. W. F. **Initial Fever in Malaria.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, June, v. 4, No. 2, 134–8, 7 figs.

" The case histories and figures show that KORTEWEG's initial fever is distinct in benign tertian malaria ; it may be doubtful and difficult to appreciate subtertian, and it seems to be non-existent in quartan malaria."

SHRUM, R. C., LANARD, F. W. & WILKERSON, D. C. **Spontaneous Rupture of the Spleen in Malaria. Report of a Case.** *J. Amer. Med. Ass.* 1952, June 14, v. 149, No. 7, 660–61.

" A case of spontaneous rupture of the spleen in a patient with malaria due to *Plasmodium vivax* is reported, with recovery following splenectomy."

MENDOZA, J. B. **Present Concepts in Malaria and its Therapy.** *J. Philippine Med. Ass.* 1952, Apr., v. 28, No. 4, 190–213, 2 pls. [28 refs.]

NOR ELDIN, G. & MORCOS, F. **Pentaquine in the Treatment of Malaria.** *J. Roy. Egyptian Med. Ass.* 1952, v. 35, No. 5, 330–34.

" Pentaquine phosphate has been used in the treatment of 50 cases of malaria, amongst which was one case of M.T. The drug is effective and was well tolerated ; the parasites usually disappeared on the 3rd or 4th day.

" The relapse rate was higher in a group of 18 cases given a 5-day-course. In the group of 22 cases given the 14-day-course, which were followed, relapse occurred only in one case. The drug was found useful in treating carriers, but the work is to be continued.

" However, its prolonged administration as a suppressive is not recommended because of its toxicity."

CSEH FIRTOS, S. **Five Years Mosquito Control with DDT in the Mental Hospital, Franeker.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, June, v. 4, No. 2, 117–23, 1 fig.

This paper, from Franeker in Friesland, would be of particular interest to institutional authorities faced with the persistent problem of biting nuisance

by mosquitoes due to neighbouring extensive breeding areas. A single application of DDT-kerosene solution at the customary dosage of 1 to 2 gm. per sq. metre to interior wall surfaces was effective for 12 to 14 months. Patients and staff were no longer troubled by mosquitoes and were seldom bitten. *P. vivax* malaria disappeared. In 5 years of usage no toxic effects of DDT were observed in patients or staff. No evidence of resistance to DDT by any of the invading insects, including house-flies, has accrued. Degrees of repellent effect were recorded for certain culicines and for *Anopheles messeae*.

R. Ford Tredre

GEORGOPOULOS, G. [*A. sacharovi* (*A. elutus*) **Resistance to DDT**] *Arch. Hyg.* Athens. 1951, Sept.–Dec., v. 2, Nos. 9/12, 246–63, 1 map, 2 diagrams & 9 figs. [21 refs.] [In Greek.] [English version 264–75.]

This paper describes field observations on *Anopheles sacharovi* in DDT-treated and untreated areas. In the Glykia-Nauplion district of Greece treatment of houses with 1·8 gm. of DDT per sq. metre normally gave adequate control of anophelines for 4–6 months in the summer. In 1951, however, the numbers of anophelines caught at unsprayed and sprayed observation points (57 days after spraying) were very similar. Adults of *A. sacharovi* had apparently become DDT-resistant. Dieldrin applied at the rate of 0·114 gm. per sq. metre proved to be effective against *A. sacharovi* in houses and there was no evidence of any resistance to this insecticide.

It was also noticed that *A. sacharovi* adults had changed their habits and preferred to rest in untreated places such as caves, bushes, outbuildings and bridges.

Clearly DDT is proving less effective against *A. sacharovi* in Greece than in previous years [but the conclusion that the mosquitoes have become DDT-resistant would be more justified had carefully controlled laboratory experiments been carried out in addition to field observations]. *C. Mary Harrison*

JADIN, J. Rapport sur la campagne de dédétisation. [**Malaria Control by Residual DDT Spraying in the Astrida Region, Ruanda-Urundi**] *Ann. Soc. Belge de Méd. Trop.* 1951, Dec. 31, v. 31, No. 6, 631–51, 2 charts.

An anti-malaria campaign, with the use of DDT residual spray, was started in July, 1949, in the Astrida region of Ruanda-Urundi, where the chief vectors are *Anopheles funestus* and *Anopheles gambiae*. Initially covering an area of some 625 sq. km., this was extended in August, 1950, to 1,800 sq. km. (694 sq. miles) with about 260,000 people. The DDT preparation used (Geigy M50) was applied so as to leave 2 gm. DDT per sq. metre (186 mgm. per sq. ft.) and the cycle of spraying was 6 months.

During the first 6 months of 1951 mosquito catching teams visited huts in the area which had received 4 treatments. In 7,020 huts 1 *A. funestus*, no *A. gambiae* and 48 culicines were caught. No details are given of the times or methods of catching. On the outside of the huts no *A. funestus* or *A. gambiae* was caught but some numbers of *A. christyi* and *A. squamosus*, and a very few *A. marshalli* and *A. demeilloni*. A short visit in June, 1951, to an untreated zone some 20 km. distant produced plenty of *A. funestus* and a few *A. gambiae* from inside the huts.

Simultaneous visits to marshes within the treated zone revealed no breeding of *A. funestus*, but larvae of the other species mentioned were found. *A. funestus* was found in marshes in the untreated zone. No specific mention is

made of the effect on breeding of *A. gambiae*. Presumably because *A. christyi* is considered a possible vector, from the partial anthropophilism previously noted for it, an experiment was tried in the application of a floatable DDT powder (*Gyron*) to a small area of marshes, at the rate of 2 gm. powder per sq. metre. After each of 2 separate applications complete absence of anopheline and culicine larvae from breeding places was noted for 2 or 3 weeks, after which breeding recommenced. The difficulties in the way of applying larvicides to large areas of this terrain are noted.

Despite the lack of any close observations of the reactions of the malaria vectors to DDT residual spray, there does seem to have been a real decrease in the actual numbers of *A. funestus* and *A. gambiae*. Other arthropods which were greatly reduced were flies, chiggers, fleas, cockroaches, and bed-bugs, while the number of lice per person in the treated zone fell to an average of 0·43 as compared with 16 per person in the contiguous untreated zone.

Surveys of malarial endemicity were made in May and June, 1951, in 10 areas in the treated zone and almost simultaneously in 2 areas in the untreated zone, in order to exclude any effect of seasonal variations. The comparative figures, with those for the untreated zone first, showed the following parasite rates : ages 1–5, 54·7 per cent. and 14·3 per cent. ; ages 6–10, 53·8 per cent. and 14·1 per cent. ; ages 11–15, 61·2 per cent. and 16·0 per cent. ; adults 50·4 per cent. and 12·4 per cent. No examinations were made of the new-born children because of the practice of distributing quinine at infant welfare clinics. As well as a fall in parasite rates in the treated zone, there was a marked reduction in the number of infections showing high parasite densities of *P. falciparum*, the predominant parasite, when the figures for 1951 were compared with those for 1949. The crude gametocyte rate fell from 1·56 to 0·053 per cent. of the population, and the incidence of *P. malariae* from 1·17 per cent. to 0·053 per cent.

In discussing the results, the author considers that the dosage of DDT used was probably excessive since the rough walls of the native huts retain the powder well. [This seems to be rather a bold statement without the use of adequate tests of insecticidal activity, and in the light of recent knowledge about the inactivation of residual insecticides.] He thinks that a 6-month cycle is probably wasteful also, and one could wait until the reappearance of mosquitoes in huts before respraying. He emphasizes that no islands should be left untreated in the zone, and thinks that complete eradication is impossible until a very large area is treated. The use of anti-malarial drugs is an important adjunct. Some factors responsible for maintaining the incidence of malaria include the constant movements of people between treated and untreated zones, the possibility that some marsh-breeding anophelines, such as *A. christyi*, may transmit infection by outdoor biting, and the possibility of mechanical transmission of malaria by non-domestic culicines. *C. C. Draper*

DUNCAN, D. **H.M. Naval Base, Singapore. A Glimpse into the Hygiene and Anti-Malarial Problems.** *J. Roy. Nav. Med. Serv.* 1952, v. 38, No. 2, 50–58.

This historical commentary of the malaria control measures associated with the construction of the Naval Base at Singapore is a useful reminder of the success attained by filling and permanent drainage ; the measures now in use vary little from those used 20 years ago. Continuity of progress in permanent drainage was interrupted by the Japanese occupation and there is much leeway to be made up ; meanwhile, temporary oiling is an effective supplementary measure in maintaining a " no malaria " status. *R. Ford Tredre*

VAN GOOR, W. T. & LODENS, J. G. ***A. aconitus* and House Spraying with DDT in West Java.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, June, v. 4, No. 2, 144–8, 1 map.

Anopheles aconitus is a vector of malaria in large ricefield areas in Indonesia. Larvicidal methods conflict with the interests of the local people, but they welcome the use of residual insecticides in their dwellings. To determine the value of residual DDT as a means of malaria control, the authors satisfied themselves on the following points :—

1. *A. aconitus* was indeed the principal vector.
2. It was a house-haunter.
3. *A. aconitus* is not repelled by DDT and is " almost certainly killed by DDT after entering a sprayed house ".

Preponderance of *Plasmodium malariae* infections and migration of part of the population from the experimental areas prevented the accumulation of reliable malariometric data for assessment of results ; however, of 16 children born in the sprayed and 16 in the unsprayed area, in the first year of the experiment, 6 contracted malaria in the unsprayed and none in the sprayed area, a statistically significant difference.

Further field experiments are to be conducted. *R. Ford Tredre*

DERRYBERRY, O. M. & GARTRELL, F. E. **Trends in Malaria Control Program of the Tennessee Valley Authority.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 500–507.

This paper is in the nature of a progress report of the Tennessee Valley Authority's malaria control programme [see this *Bulletin*, 1948, v. 45, 759, 822]. Principal elements are reservoir preparation, water level management, permanent shore-line improvement, shore-line and drainage maintenance and the use of larvicides. Of these, water level regulation remains the most effective single mosquito control measure ; with experience certain refinements of the schedules have been introduced. In shore-line improvement, deepening and filling operations have achieved excellent mosquito control without supplementary larvicides, but dyking and de-watering projects have yielded unfavourable results, both for mosquito control and costs of operation and maintenance ; supplementary larvicides have been necessary and in certain areas water level fluctuations have been introduced by means of manipulation of the de-watering pumps. Shore-line maintenance by vegetation clearance is costly ; this has been greatly reduced by disregarding the upper 6 inches of the normal fluctuation zone and substituting less expensive larviciding when necessary. DDT thermal aerosol (at a dosage of 0·05 lb. DDT per acre) is the only larvicide used and applied only from special spraying equipment in aeroplane or helicopter.

The general conclusion is that the methods have been successful and that, in particular, naturalistic controls and much of the foundation for artificial controls should be a part of the initial planning of all such schemes of conservation of water resources in malarious areas. Attention is drawn to the belief that over the past few years *A. quadrimaculatus* larvae appear to be developing a tolerance to DDT when used as a larvicide : and this has

necessitated an increase of the application rate of DDT from 0·05 to 0·1 lb. per acre. *R. Ford Tredre*

HAWKING, F. & THURSTON, June P. **Chemotherapeutic and other Studies on the Pre-Erythrocytic Forms of Simian Malaria** (*Plasmodium cynomolgi*). *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, May, v. 46, No. 3, 293–300, 6 figs. on pl. [11 refs.]

In the chemotherapeutic investigations here described 18 rhesus monkeys including 5 controls were inoculated intraperitoneally with a suspension of 1,000 to 2,000 mosquitoes infected with *P. cynomolgi* ground in Ringer solution containing 10 per cent. serum. Drugs were administered by stomach tube in 10 to 20 ml. water in approximately maximum tolerated doses during the pre-patent period. Liver biopsies were made at intervals and the sectioned tissue was examined for the presence of parasites and the number per volume estimated. It was found that quinine or mepacrine did not destroy the pre-erythrocytic forms in the liver, but chloroquine possibly had some slight effect. Proguanil given daily during the pre-patent period prevented detection of these forms but did not eradicate the infection, and sulphadiazine acted in a similar way. Pamaquin on the other hand destroyed the pre-erythrocytic forms and prevented infection. The results thus obtained correspond to those for *P. vivax* in man. When sporozoites were injected into 2 monkeys which had been infected with *P. cynomolgi* some time previously, pre-erythrocytic forms were found in the liver but the infection of red cells was of a transient and minor nature, suggesting that immunity is directed chiefly against blood forms of the parasite. After injection of the sporozoites of *P. vivax* into the liver of a rhesus monkey, and also the spleen (whence they could be carried to the liver by the splenic vein), no evidence could be obtained for their development in the former site. *J. D. Fulton*

WHITFELD, P. R. **Nucleic Acids in Erythrocytic Stages of a Malaria Parasite.** [Correspondence.] *Nature.* 1952, May 3, 751–2, 1 graph.

It is generally recognized that the metabolism of nucleic acids is associated in some way with protein synthesis in the organism. A study of these processes has been made in *P. berghei* obtained from infected mice. About 8 days after intraperitoneal inoculation with infected blood, when 30 to 40 per cent. of red cells were infected, and a degree of anaemia was present as well as an increased number of white cells, the animal was bled. Separation of normal and parasitized cells proved difficult and nucleic acids were therefore estimated in the residue obtained after haemolysis of infected blood in which ghosts of red cells and white cells were also present. The amount of nucleic acid in normal blood similarly treated was also determined and used as a correction. With increased parasitaemia there was an accompanying increase of ribose and desoxyribose nucleic acids. The values found per parasite are quoted and compared with values for other cell nuclei. In *P. berghei* the amount of ribose nucleic acid was about twice that of the desoxy acid [no indication is given, however, of the stage of development of the parasites which would influence this figure]. For qualitative examination of the nucleic acids, separation of parasitized cells was attempted by differential centrifugation, after haemolysis of the blood, and the absorption curve of extracted nucleic acid was plotted. The constituent purine and pyrimidine bases identified by chromatography were guanine, adenine, cytosine, uracil and thymine as found in nucleic acids of other organisms, but 5-methyl cytosine was not detected. *J. D. Fulton*

RODHAIN, J. & VINCKE, I. Note au sujet de l'évolution du *Plasmodium berghei* chez *Anopheles maculipennis* var. *atroparvus*. [**Note on the Development of** *Plasmodium berghei* **in** *Anopheles maculipennis* **var.** *atroparvus*] *Ann. Soc. Belge de Méd. Trop.* 1952, Apr. 30, v. 32, No. 2, 165–7.

The authors obtained a 3 per cent. infection rate (of scanty immature oöcysts) using infected *Thamnomys surdaster* and *Anopheles maculipennis atroparvus* kept at a temperature of 23°–24°C. [see this *Bulletin*, 1951, v. 48, 871]. Further experiments gave much the same results : oöcysts were scanty, of irregular size and contour, and unsegmented ; they were found 18 to 28 days after the infecting feed. YOELI and WALL [*ibid.*, 1952, v. 49, 372] obtained a 62 per cent. infection rate (including viable sporozoites) by using hamsters infected with the same strain, and the same subspecies of *Anopheles*, but kept at a temperature between 26° and 27°C. The authors think that the conflicting results may be due to differences in (*a*) the host, (*b*) the temperature, or (*c*) the strain of *Anopheles*, and are attempting to unravel the problem by using newly isolated strains of *Plasmodium berghei*. *P. C. C. Garnham*

YOELI, M. & WALL, W. J. **Cyclical Transmission of** *Plasmodium berghei* **in the Laboratory.** [Correspondence.] *Nature.* 1952, May 24, 881.

The authors have recently described the sporogonic development of *P. berghei* in experimentally infected anophelines [this *Bulletin*, 1952, v. 49, 372]. They have now successfully carried out cyclical transmission of the parasite experimentally.

A hamster infected 8 days before with the Kasapa strain of *P. berghei* was fed upon by a batch of laboratory-bred *Anopheles quadrimaculatus* and *A. stephensi* ; at this time, gametocytes were numerous in the peripheral blood. Dissection of the mosquitoes' stomachs revealed a 50 per cent. infection rate. Ten days later, 22 and 20 respectively of the mosquitoes of this batch bit and fully engorged themselves on a white rat 1 month old. Their salivary glands were removed and injected into the rat next day.

Daily blood smears showed the presence of 3 young, vacuolated parasite rings 6 days after the rat had been bitten. At the time of reporting, no exo-erythrocytic forms had been found in preparations from different organs, but 2 mature schizonts of haematogenous origin were found in the bone marrow. It may be inferred, therefore, that the blood cells had been invaded about the fourth day after sporozoite inoculation. The work is continuing.

H. J. O'D. Burke-Gaffney

BLACK, R. H. **Parasitic Recrudescences in Trophozoite-Induced** *Plasmodium berghei* **Infections in the Albino Rat.** *Ann. Trop. Med. & Parasit.* 1951, Dec., v. 45, Nos. 3/4, 199–206, 7 figs.

The author records the duration of infections with *Plasmodium berghei* in rats, based on observations of parasitic recrudescences following the initial parasitaemia and on those induced by splenectomy. Parasitic recrudescence is defined as the reappearance of malaria parasites at microscopic densities following a negative period, when parasites are undetectable in blood films, though present in the circulation at submicroscopic densities.

The strains used in the experiments were maintained in rats by weekly blood passages with standard doses of 50 million infected erythrocytes inoculated intraperitoneally. Parasite counts were based on the number of infected red cells per 500 cells or, if that figure was zero, on the number of parasites in 50 fields of 100 cells each.

The mean primary parasitaemia was 15 days, after which parasites became undetectable. Spontaneous recrudescences generally occurred 6–22 days after recovery (mean 27·6 days after infection) and lasted 1–5 days. In the majority of recrudescenses the density was 1–3 parasites per 50 fields. This phenomenon was studied further by daily subinoculations of 20 cmm. of blood from 2 rats into mice following parasitaemia. These experiments showed that in the rats the number of parasites per 2 cmm. first fell to ± 1, then rose to microscopic densities on the 23rd day, remained at this level for 2–3 days, and again dropped below 1. There followed another rise to a level of more than 1 parasite lasting 1 and 11 days in the 2 rats respectively, after which the density fell below 1 parasite for the same volume of blood. Mice inoculated from one rat on the 70th day became infected, while those infected from the other rat on the 91st day were negative.

With similar methods, it was found that splenectomy induced recrudescences only when the operation was performed up to the 52nd day after infection of the rats. It is considered that the spleen is mainly responsible for the disappearance of the parasites from infected rats. *C. A. Hoare*

Fabiani, G. & Vargues, R. Comportement des hématozoaires de réinoculation dans le sang du rat guéri d'infection à *Plasmodium berghei*. [**Behaviour of Parasites Reinoculated into the Blood of Rats Recovered from** *P. berghei* **Infection**] Reprinted from *C. R. Acad. Sci.* 1951, v. 233, 502–4.

See also this *Bulletin*, 1952, v. 49, 670.

Sergent, Ed. & Sergent, Et. Recherches expérimentales sur l'infection latente et la prémunition dans le paludisme. [**Experimental Research on Latent Infection and Premunition in Malaria**] *Arch. Inst. Pasteur d'Algérie*. 1950, Mar., v. 28, No. 1, 1–70, 27 figs. [45 refs.]

This interesting dissertation is for the most part a synopsis of researches carried out over very many years on avian malaria. Most of this work is well known to all malariologists. It has made most important contributions to our knowledge of the relationship between the malaria parasite and its vertebrate host and provided a technique for determining the efficacy of anti-malaria drugs. All the experiments were carried out with *Plasmodium relictum*, with which the passerines of Algeria are almost universally infected, and imported canaries free from infection.

In all cases infection was produced by inoculation of infected blood. The strain of *P. relictum* used has been passed through 1,218 canaries over a number of years, without any morphological change or loss of infecting power. When the blood is taken from the donor bird during the acute stage of the infection the period of incubation in the recipient varies from 2 to 25 days, mean 7 days. Birds which survive the acute attack still harbour parasites in the blood stream. The acute attack rarely lasts a month, most commonly only 10 days, but the subsequent latent infection has been found to last for as long as 4 years and 3 months. The average length of life of a canary is only 7 years. Microscopic examination of the blood may fail to reveal the presence of parasites during this latent period. Withdrawal of as much as 0·2 cc. of blood, which is one-fifth of the total volume of a canary's blood, and which can be done without detriment to the bird, and reinoculation into another susceptible bird, may be necessary to establish the persistence of infection. If such measures be taken it would seem that some 80 per cent. of canaries which have survived the acute attack remain carriers of infection.

It is not possible to give an adequate summary of a paper such as this. It is an astonishing record of painstaking research. *Norman White*

SERGENT, Ed. & PONCET, A. Remarques sur l'association du paludisme à *Plasmodium relictum* et du paludisme à *Plasmodium rouxi* chez les mêmes oiseaux. [**Notes on the Association of** *Plasmodium relictum* **and of** *P. rouxi* **in the Same Birds**] *Arch. Inst. Pasteur d'Algérie.* 1952, Mar., v. 30, No. 1, 31–43, 12 figs.

For 32 years many hundreds of canaries suffering from double infections of *Plasmodium relictum* and *P. rouxi* have been studied in Algiers. The two species have maintained their individual characters without apparent change—no hybrids have appeared any more than they have in the human malaria parasites, likewise so often found mixed in a single host. Birds inoculated with the two parasites will often show *P. rouxi* alone at the commencement. Subsequently, this parasite will disappear when *P. relictum* takes the field—similar " parasitic occultations " (Parrot) are common in human infections with *P. falciparum* and *P. vivax* (and also in the piroplasms). Some birds, however, respond quite differently, and 10 illustrations are given where *P. relictum* alone was seen in the primary attack and the *P. rouxi* was only demonstrated when a second inoculation of pure *P. relictum* was given 1 to 4 years later. In other words *P. rouxi* had remained latent during these intervals and only came into the open when provoked by the new inoculation. [In some of the illustrations, the *P. rouxi* appeared the day after reinoculation, long before the new *relictum* parasitaemia, and its emergence may well have been due to the provocative effect of inoculation of blood.] *P. C. C. Garnham*

DA FONSECA, F. Plasmódio de primata do Brasil. [**Plasmodium from Brazilian Monkey**] *Mem. Inst. Oswaldo Cruz.* 1951, Mar., v. 49, 543–51, 12 figs. (8 coloured) on 2 pls. [13 refs.] English summary.

Up to the present the only known malaria parasite naturally infecting various monkeys of the New World was *Plasmodium brasilianum,* which is characterized by quartan periodicity of its asexual cycle.

In 1939, the author made serial blood films and tissue smears, extending over 10 days, from a howler monkey, *Alouatta fusca,* captured in the State of São Paulo. The blood films revealed the presence of a parasite which was then identified as *P. brasilianum.* Recently the author re-examined these preparations, which were in a good state of preservation, and found that the parasite in question differed from *P. brasilianum* in the following characters : the host-cells harbouring all stages of the parasite are always stippled with Schüffner's dots and enlarged (from 7·6 μ to about 9 μ in the case of trophozoites, and to about 9·7 μ in the case of schizonts) ; the usual number of merozoites produced by schizogony is 16, rising up to 35 in some cases ; band-forms are extremely rare.

The young trophozoites are small and compact, occupying about one-fifth of the host-cell ; as they grow they become ring-formed and take up from one-quarter to half of the red cell. At this stage no pigment is present. The schizonts are said to be large [but from the figures it is seen that they do not fill the entire red cell] and pigmented. The gametocytes are of the *vivax* type. Judging from the sequence of stages appearing in the preparations in the course of 10 days, it would appear that the periodicity of the development of this parasite is of the tertian type. The examination of organ smears (spleen, liver, brain and kidneys) failed to reveal any EE forms. This parasite is regarded as a new species for which the name *P. simium* is proposed. Different stages of its development are depicted in a coloured plate. *C. A. Hoare*

RENJIFO, S., SANMARTÍN, C. & DE ZULUETA, J. **A Survey of the Blood Parasites of Vertebrates in Eastern Columbia.** *Acta Tropica.* Basle. 1952, v. 9, No. 2, 151–69, 1 map & 42 figs.

TRYPANOSOMIASIS

FERREIRA, F. S. da C. Relatório do chefe da Missão de estudo e combate da doença do sono na Guiné, referente ao ano de 1950. [**Report of the Sleeping Sickness Commission in Portuguese Guinea for 1950**] *Anais Inst. Med. Trop.* Lisbon. 1951, Mar., v. 8, No. 1, 91–129, 17 figs., 2 charts & 1 map.

A review of the work of the Commission. For the Report for 1949, see this *Bulletin*, 1951, v. 48, 340.

FERREIRA, T. Tripanossomíases no Mutuali. Aspectos gerais do problema da tsé-tsé. [**Trypanosomiasis in Mutuali, Mozambique. General Aspects of the Tsetse Problem**] *Anais Inst. Med. Trop.* Lisbon. 1951, June, v. 8, No. 2, 171–274, 18 figs. & 3 charts. [36 refs.] English summary.

DIAS, J. A. T. S. Resultados de um reconhecimento glossínico a algumas circunscrições da província do Sul do Save. [**Results of a Tsetse Fly Survey in Certain Districts of the South Save Province, Mozambique**] *Anais Inst. Med. Trop.* Lisbon. 1951, Sept., v. 8, No. 3, 313–56, 24 figs. & 3 folding maps. [19 refs.] English summary.

CLAESSENS, H. Bestrijding der slaapziekte door preventieve prophylaxis in de Maniema-streek tijdens de jaren 1938–1950. [**Preventive Prophylaxis of Sleeping Sickness in the Maniema Area, Belgian Congo, from 1938–1950**] *Ann. Soc. Belge de Méd. Trop.* 1952, Apr. 30, v. 32, No. 2, 121–40. [31 refs.]

The following is a translation of the author's summary :—

The author records results obtained with "preventive" prophylaxis by means of Bayer 205 on the one hand and propamidine and pentamidine on the other.

As regards the prophylactic use of Bayer 205, at a dosage of 2·5 cgm. [25 mgm.] per kgm. the author records the different accidents which may occur.

At Kibombo, 5,500 Africans were injected 4 times between May 1945 and January 1946. In 1944, 306 new infections occurred from the beginning of the use of Bayer until 22 July 1946, when only 27 new cases were noted. At Kasongo, 13,147 Africans received 3 prophylactic injections : at Lusangi, 6,500 received 4. The reduction of new cases was spectacular. The author discusses the new cases seen after prophylactic injection. He thinks that in some cases the drug has masked the infection.

Regarding propamidine, which was used in several villages with high reinfection indices, the results were very favourable and corresponded with those already published.

The author records the reactions which may occur after the intramuscular injection of 5 mgm./kgm. of propamidine, especially the abortive action in pregnant women.

Regarding pentamidine, it was employed in prophylactic doses in an active focus of trypanosomiasis in the Kabambare region, where there are 9,828 Africans.

The author concludes that pentamidine does not provoke abortive reactions and that its preventive action is real : it should be the drug of choice.

H. J. O'D. Burke-Gaffney

DESOWITZ, R. S. & WATSON, H. J. C. **Studies on *Trypanosoma vivax*. I.—Susceptibility of White Rats to Infection.** *Ann. Trop. Med. & Parasit.* 1951, Dec., v. 45, Nos. 3/4, 207–19, 2 figs. [11 refs.]

The authors first review previous attempts to infect small laboratory mammals with *Trypanosoma vivax*, and then report the results of their own experimental infections of white rats carried out in Nigeria. The strain of trypanosome used was obtained from a sheep and maintained in these animals by cyclical transmission with *Glossina palpalis*. The rats were infected by inoculation of sheep's blood intracardially or intraperitoneally.

The total number of rats inoculated with large quantities of infected sheep's blood was 69, all of which, except one, became infected. The degree of infection in the rats varied considerably. Usually the trypanosomes appeared in the peripheral blood 1–2 days after inoculation, their number increased for 3–7 days and reached a peak, then the infection declined during the next 1–3 days, after which they disappeared completely, though in some cases there were relapses. Many of the rats were indisposed as the result of the infection, but none died. Inoculations of blood were also made from infected rats to 19 clean rats, all of which produced infections. However, in attempts to produce a second passage from rat to rat, 2 out of 7 rats proved to be refractory. Moreover, the infections in rat passages were milder than those in sheep-to-rat transfers.

In discussing these observations, the authors suggest that the results of experimental inoculation of *T. vivax* may depend on the host used as donor, for attempts to infect rats and guineapigs with infected bovine blood failed. It is also thought that the success of the primary inoculation of rats from sheep, as contrasted with the failure to passage the trypanosomes further through rats, might be due either to blockade of the lymphoid-macrophage system of the rats by " foreign " sheep's erythrocytes, thereby lowering the defence mechanism of the rats, or to the presence in the sheep's blood or some factor favouring the development of the trypanosome in rats. *C. A. Hoare*

UNSWORTH, K. & NESBITT, P. E. **Studies on *Trypanosoma vivax*. II.—The Maintenance of a Strain in Rabbits.** *Ann. Trop. Med. & Parasit.* 1952, May, v. 46, No. 1, 85–91.

DESOWITZ, R. S. & WATSON, H. J. C. **Studies on *Trypanosoma vivax*. III.—Observations on the Maintenance of a Strain in White Rats.** *Ann. Trop. Med. & Parasit.* 1952, May, v. 46, No. 1, 92–100.

EYLES, D. E. **Incidence of *Trypanosoma lewisi* and *Hepatozoon muris* in the Norway Rat.** *J. Parasitology.* 1952, June, v. 38, No. 3, 222–5.

" A total of 220 wild Norway rats caught in the City of Memphis, Tennessee, were examined for *Trypanosoma lewisi* and *Hepatozoon muris*. Incidence of the former was 13·2 per cent and the latter, 4·8 per cent. *T. lewisi* was found to be more prevalent in a winter sample than in a summer sample ; whereas, no seasonal difference could be demonstrated for *H. muris*. *T. lewisi* was most prevalent in immature rats (under 100 grams) and young mature rats (100 to 199 grams), and was rare in rats over 300 grams. *H. muris* was not found in young rats (under 100 grams). It occurred most frequently in the 100 to 199 gram weight class and was not found in rats over 400 grams in weight."

Romaña, C. La enfermedad de Chagas. [**Chagas's Disease**] Reprinted from *Rev. Roche.* 1951, July–Aug., v. 4, Nos. 7/8, 3–23, 13 figs.

A general account in Spanish. [Readers will be familiar with Dr. Romaña's numerous contributions on this subject from Tucumán.]

Miranda, J. R. Dados sôbre a doença de Chagas no município de Córrego Danta. (Oeste de Minas Gerais). [**Data on Chagas's Disease in Córrego Danta, Minas Gerais, Brazil**] *Rev. Assoc. Méd. Minas Gerais.* 1951, Sept., v. 2, No. 2, 163–8, 1 map. [24 refs.] English summary.

McRary, W. L., Noble, E. R. & Tondevold, E. L. **Blood Factors in the Nutrition of *Trypanosoma cruzi*.** *Science.* 1952, Mar. 14, 288.

It is generally held that for the successful cultivation of *Trypanosoma cruzi* the medium should contain blood or its derivatives, especially haemoglobin. To verify this view, the authors have carried out experiments using the following medium. Thrice recrystallized haemoglobin was prepared from human erythrocytes washed 6 times, after which the protein was dissolved in water and dialysed until free of salts, passed through a Seitz filter, and stored under sterile conditions. For cultures a diphasic medium was used, consisting of 3 ml. agar slant and 2 ml. overlay. Both the solid and liquid phases contained 0·2 per cent. glucose, 0·5 per cent. NaCl, and 2 per cent. peptone, at *p*H 7·4. Before autoclaving, 4 mgm. of haemoglobin was added to the agar. Starting with 0·1 ml. inocula, subcultures were made every 18–22 days, when the parasite count was 12 million /ml. In this medium the flagellates have grown abundantly through 13 transfers. Media were also prepared with amounts of haemoglobin varying from zero to 3 mgm. In this series growth of the flagellates was proportional to the amount of haemoglobin present. When the haemoglobin was not heated, the cultures could not be carried beyond the second transfer, but the addition of ascorbic acid or serum to unheated haemoglobin supported growth up to 8 subcultures. However, substitution of haemin, of acid or peptic hydrolysates of haemoglobin, and of a haeme-globin mixture, for the heated protein, produced negative results.

It is concluded " that a moderately complex derivative of hemoglobin is the only additional essential growth factor " for the authors' strain of *T. cruzi*, when peptone, glucose and NaCl are present in the medium. *C. A. Hoare*

Machado, H. Do encontro de um exemplar de *Panstrongylus megistus* infectado com *Trypanosoma* no município de Redenção, Estado do Ceará. [**Record of a Specimen of *Panstrongylus megistus* Infected with a Trypanosome in Redenção, Ceará, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1951, July, v. 3, No. 3, 488–9.

Ryckman, R. E. **Laboratory Culture of Triatominae with Observations on Behavior and a New Feeding Device.** *J. Parasitology.* 1952, June, v. 38, No. 3, 210–14, 1 fig.

The methods used in the author's laboratory, for rearing Triatominae, are described. Experiments have shown that a temperature of 30°C., and a relative humidity of 50 to 60 per cent., are most satisfactory. When handling the insects, an enamel tray with a 2-inch vertical wall will restrict *Triatoma* but not *Rhodnius*. Bugs of the latter genus are anaesthetized with carbon dioxide before removing from the rearing jars. A 2-inch band of adhesive tape, with the gummed side exposed, is an effective barrier to walking *Triatoma*. In parts of the U.S.A. where wild Triatominae may enter houses, the legs of beds may be ringed with adhesive tape.

The essential feature of the feeding device used by the author is that the rabbit on which the bugs are fed is immobilized, in a natural posture, over an opening, through which the bugs, in their rearing jars, are brought into contact with the abdomen. The abdomen of the rabbit is clipped, but need not be shaved. When bugs feed in this way, their faeces do not contaminate the rabbit, and there is no danger of transmitting *Trypanosoma cruzi*, with which field-collected Triatominae may be infected. Details of the construction of this feeding device are given. *A. J. P. Goodchild*

GOBLE, F. C. **Activity of certain 6-Methoxy-8-Aminoquinolines against** *Trypanosoma cruzi*. *Antibiotics & Chemotherapy*. New York. 1952, May, v. 2, No. 5, 265–70. [20 refs.]

The author [this *Bulletin*, 1949, v. 46, 1131] had previously found that pentaquine (6-methoxy-8-(5 isopropylaminoamylamino)quinoline) was most active against *T. cruzi* infections of mice among a number of related substances tested. The investigation of these 8-aminoquinolines has been continued and an attempt has been made to relate activity with chemical structure. The technique of using 200 to 400 3-week-old mice infected by intraperitoneal inoculation of 30 million culture forms of the organism for each test has been described [*ibid.*, 1951, v. 48, 1095]. Thirty drugs were used and their survey numbers [WISELOGLE—*Survey of Antimalarial Drugs*, *ibid.*, 1947, v. 44, 1106] as well as chemical composition are indicated. Administration was by mouth, at a dosage level of 15 mgm. per kilo, for 6 days per week over a period of 3 weeks. This regimen was varied to find out the most suitable time for treatment and also in prophylactic tests. When the activity of a substance approached that of pentaquine, 3 different dosage levels were investigated. Pentaquine, isopentaquine, and primaquine which possess antimalarial activity, were the most active and have 5 carbon atoms in the side chain between the nitrogen atoms. Species differences in toxicity in dogs and mice were shown and made it difficult to decide which was most active. Therapeutic trials in man with these 3 substances appear to be indicated. *J. D. Fulton*

FEVERS OF THE TYPHUS GROUP

PÉREZ GALLARDO, F., CLAVERO, G. & HERNÁNDEZ, S. Nota previa sobre la infección del lirón español ("Eliomys quercinus") por la "Rickettsia prowazeki". [**Preliminary Note on Infection of the Spanish Garden Dormouse** (*Eliomys quercinus*) **with** *Rickettsia prowazeki*] *Rev. Sanidad e Hig. Pública*. Madrid. 1951, Dec., v. 25, No. 12, 713–15, 2 figs. on pl.

The following is a translation of the authors' summary :—

The Spanish garden dormouse, *Eliomys quercinus* acquires a lethal infection when inoculated with *R. prowazeki*, paraplegia being one of the prominent features of the disease.

Convalescent animals show immunity when reinoculated with heavy lethal doses.

Also complement-fixing antibodies appear in convalescent animals.

H. J. O'D. Burke Gaffney

Liu, Wei-t'ung & Landauer, E. **Observations on a Non-Typhus Rickettsia-Like Organism in the Human Body Louse,** *Pediculus humanus* **var.** *corporis*. *Chinese Med. J.* Peking. 1952, Mar.–Apr., v. 70, Nos. 3/4, 115–39. [70 refs.]

In the 7 months, January to July, 1941, 46 cases of typhus and typhus-like fever occurred among 347 inmates of a relief institution in Peking in which conditions of squalor and louse-infestation were pronounced. In the period of 8 months, April to November, rickettsia-like organisms were seen in smears made from lice found on 16 out of 23 convalescents and on 74 out of 214 contacts. Similar organisms were recovered from laboratory-reared lice which had been allowed to feed on 10 out of 19 convalescents tested and on 12 out of 41 contacts tested. One to 8 tests were made on the various persons, and the results indicated that the rickettsiae were present in the blood, continuously, intermittently, or for a brief period. Although the organisms in smears did not differ obviously from *Rickettsia prowazeki*, guineapigs inoculated with suspensions of the infected lice were not immune to later inoculation with murine typhus rickettsiae, and albino rats inoculated in the same way developed *Proteus OX19* agglutinins infrequently, and then at low titres.

The organisms were, therefore, regarded as antigenically distinct from *R. prowazeki*. The authors discuss the possible identity of the rickettsiae with *R. quintana* of trench fever and with *R. pediculi* and *R. rochalimae*, all three of which may perhaps be the same organism, existing normally in man as a commensal but capable of becoming virulent when transmitted in rapid succession through the man-louse-man cycle.

In the summary the authors give a valuable documented summary of the literature of the above-mentioned rickettsiae. *John W. D. Megaw*

Kalra, S. L. & Rao, K. N. A. **Typhus Fevers in Kashmir State. Part II. Murine Typhus.** *Indian J. Med. Res.* 1951, July, v. 39, No. 3, 297–302.

The authors briefly describe the first systematic investigation that has been conducted into the fevers of the typhus group in Kashmir where till recently epidemic typhus was thought to be the only one of these fevers occurring in the state. " In the summer of 1948 it was noticed that many cases of typhus in Srinagar were sporadic and single infection in household, which could only fit in with the epidemiological pattern of Murine typhus." Within 2 years 178 cases were seen in different parts of the valley of Kashmir ; most of the cases were mild and a rash was detected in only 44, yet the death rate in different villages varied from 8 to 17 per cent. These high figures are attributed to lack of medical aid ; no fatality occurred among those in hospital.

Serological tests were made in 53 cases of which 43 reacted at high titres with *Proteus OX19* and at low titres with *P. OX2* ; 4 had high titres with *P. OX19* only, in 1 the titre with *P. OX2* was higher than with *P. OX19* and 5 were negative. With the complement-fixation test, 37 patients reacted with murine antigen only ; 11 reacted also with epidemic antigen, but at lower titres, and the 5 patients who failed to react with the Weil-Felix test were negative also with the fixation test. None of the sera reacted with Rocky Mountain spotted fever antigen.

Strains of murine rickettsiae were isolated from 2 patients ; 2 strains were recovered from lice found on patients ; 1 strain was recovered from the pooled brains of 4 rats from an infected house, and 1 strain from 7 fleas (*Xenopsylla cheopis* and *X. astia*) collected from these rats.

The incidence of the disease was high in spring and summer ; of the 178 cases 132 occurred in the 6 months March to August, and in Srinagar 34 cases

occurred in March to September, but only 2 in the rest of the year. The disease was uniformly distributed over Kashmir. On investigation of village outbreaks it was repeatedly found that cases had been occurring at intervals during the previous 3–5 months and that some of the cases were single infections in each household while in other houses "the first case started a spaced chain of infections in the family, but rarely more than one member was sick at the same time. Although no outbreak was explosive, the epidemiological pattern was more like epidemic typhus than murine. The people were invariably louse-infested and it is probable that louse also acted as a vector, though a poor one, besides the rat flea. The infection of lice with Murine *rickettsia* strongly supports this view."

The authors conclude that the chief problem of Kashmir is murine typhus and not epidemic typhus, which occurs rarely, although delousing will still have to be included in any control measures.

In the summary the authors state "It is shown that Murine typhus is endemic in Kashmir and that lice also plays a part in its spread".

[Some workers are likely to doubt whether the information supplied in the paper justifies the statement that lice have been "shown" to play a part in the spread of murine typhus in Kashmir. The recovery of *Rickettsia prowazeki* from lice found on patients does not prove that the lice were acting as vectors of the infection though it suggests that they may have been doing so. The earlier statement that "it is probable" that the louse also acted as a vector will be more generally acceptable, assuming that the household infections referred to were spaced in such a way as to suggest transmission from person to person. In any case nobody will question the soundness of the conclusion that "delousing will still have to be included in any control measures".]

Ten confirmed cases of scrub typhus were seen in July, 1948, in a recently occupied camp site at Tanghdhar, which is situated in a narrow valley whose bed is at an elevation of 4,000 feet. *Rickettsia tsutsugamushi* [*orientalis*] was recovered from 2 patients, also from 3 out of 8 pools of larval mites, most of which were *Trombicula deliensis*, and from a rat, *Rattus rattoides*.

In the Jammu Province of Kashmir there were 15 cases of scrub typhus in 1948, in 1949 there were 18 cases, and in 1950 there were more than 26.

All but 3 of the above cases occurred in the rainy season, August and September. The Jammu hills form part of the Siwalik range which lies in the outer Himalayas and extends from Assam to Afghanistan; this range is studded all over with innumerable patches of scrub typhus the incidence of which is directly proportional to the rainfall, decreasing rapidly from Assam and Bengal towards the west where the precipitation becomes less and less. The prevailing tick is *T. deliensis*. *John W. D. Megaw*

KALRA, S. L. & RAO, K. N. A. **Typhus in Bangalore and Mysore.** *Indian J. Med. Res.* 1951, July, v. 39, No. 3, 303–9.

The authors, in 1948, studied the fevers of the typhus group in Bangalore and Mysore in South India. Among 13 patients seen in Bangalore the Weil-Felix reaction was positive at higher titre with *Proteus OX19* than with *P. OX2* except in one case in which the titre was the same (1–500) with both strains. Among 10 patients examined by the complement-fixation test 9 reacted against murine antigen only; one reacted also against Rocky Mountain spotted fever antigen, but at a lower titre.

Strains of murine rickettsia were isolated from 2 out of 4 patients.

From the records it was found that during the 6 years 1942–47, there had been 145 cases of typhus-group fevers in the Military Hospital and that most

of them had occurred during the cooler months, December to April. The rat-flea index in the cantonment was 2·8 in June–July ; it rose to 7·0 in October–November, " towards the approaching peak season of typhus ". The increase was greatest among *Xenopsylla brasiliensis*, less among *X. cheopis* and insignificant among *X. astia*. From 15 pools of mixed species of fleas—1,759 altogether—3 strains of murine rickettsiae were recovered. From 11 pools made from a total of 106 rats 3 strains were recovered, and another strain was obtained from one of two bandicoots in an infected house.

In Mysore a strain was isolated from one out of 4 pools of *X. brasiliensis* ; a pool of *X. astia* and 4 pools of *X. cheopis* gave negative results. From 14 pools, each of which was made from the brains of 10 rats, 4 strains were recovered.

In a study of the strains from both areas conflicting reactions were obtained in male guineapigs ; strains from patients caused fever in 7 out of 14 animals, but scrotal reaction in none. Among 21 animals inoculated with flea strains 15 had febrile reactions but only one had a scrotal reaction. The strains from rats and bandicoots caused fever and scrotal reactions in all the 27 animals tested. Complement-fixation and cross-immunity tests showed that all the strains were murine.

Reference is made to the complement-fixation tests by Topping *et al.* in 1943 [this *Bulletin*, 1944, v. 41, 29] on sera from 3 patients in Mysore ; the findings indicated infection of the Rocky Mountain spotted fever type.

The authors conclude that at least two typhus fevers occur in Mysore, " the Murine and the spotted fever group ". *John W. D. Megaw*

Harrison, J. L. **Reproduction in Rats of the Subgenus** *Rattus*. Reprinted from *Proc. Zool. Soc. London*. 1951, Nov. 19, v. 121, Pt. 3, 673–94, 6 figs.

Kilpatrick, J. W. & Fay, R. W. **DDT-Resistance Studies with the Oriental Rat Flea.** *J. Econom. Entom.* 1952, Apr., v. 45, No. 2, 284–8, 3 figs.

In spite of the increasing number of instances of insect species becoming resistant to insecticides there has been no evidence of such a resistance occurring in the oriental rat flea *Xenopsylla cheopis*. Cases where *Ctenocephalides felis* (the cat flea) was not adequately controlled by three applications of 5 per cent. DDT pyrophyllite dusts have been noted. The cat flea, however, is not proved to be a vector of any infectious disease. If a resistance to insecticides similar to that of the cat flea should arise in *Xenopsylla cheopis*, which is a carrier of murine typhus, the situation would be serious.

An attempt was made therefore to raise a strain of *X. cheopis* resistant to DDT in the laboratory. Fleas were exposed to cardboard discs treated with 50 mgm./sq. ft. of dust applied as a 5 per cent. DDT dust in pyrophyllite. A series of 4-minute exposures to such a surface gave an average of 65 per cent. mortality. The survivors were used to give the next generation. The mortality of successive generations when exposed to 50 mgm./sq. ft. dust for 4 minutes gradually decreased as follows :—

P1	generation	average	mortality	65	per cent.
F1	,,	,,	,,	53	,, ,,
F2	,,	,,	,,	47	,, ,,
F3	,,	,,	,,	32	,, ,,
F4	,,	,,	,,	33	,, ,,
F5	,,	,,	,,	37	,, ,,

No further increase in resistance was realized, however, in the F6 and F7 generations, even after exposures for 8 minutes to the insecticide.

Selection under laboratory conditions does not compare with selection in the field where fleas would probably be in contact with the insecticide for hours rather than minutes. An exposure of 24 hours to a dust containing 0·005 per cent. DDT gave a complete kill, but dusts containing only 0·0005 per cent. DDT gave no mortality. Dust deposits containing 0·0005 per cent. DDT were recovered from the field after treatment 1 or 2 years previously. It is therefore not possible to predict the type of selection which would occur in a wild population. *C. Mary Harrison*

WOMERSLEY, H. **The Scrub-Typhus and Scrub-Itch Mites (*Trombiculidae*, Acarina) of the Asiatic-Pacific Region.** *Records of the South Australian Museum.* 1952, Mar. 1, v. 10, Pts. 1 (text) & 2 (pls.), 1–435 ; 438–673, 3 figs., 2 graphs & 118 pls. [193 refs.]

The possibility that mites other than *Trombicula akamushi* and *T. deliensis* may be potential vectors of scrub typhus has rendered the detailed taxonomic study of such mites a matter of utmost importance. This monograph is restricted to a consideration of the systematics of the mites of the family Trombiculidae of the Asiatic-Pacific Region. It is not concerned with the bionomics.

Some idea of the scope of the work can be obtained from the following facts : the book is in two large paper-backed volumes, the first containing over 400 pages of text and the second 118 plates of line drawings of the species : 222 species are known as larvae and 53 adult or nymphal forms are listed ; of the latter 46 have been correlated with larvae. From the rest of the world 26 species are dealt with, in only 10 of which the adults or nymphs or both have been correlated with the larvae. Seventy-seven new species are described mainly from the larvae. This list is of course nowhere near complete and it is believed that in this region there are possibly as many more species still undescribed.

The main part of the book, Classification and Systematics (390 pages) begins with a list of the characters for separating the families Leeuwenhoekiidae and Trombiculidae ; the rest of the book is then devoted to the latter family. The Trombiculidae contains two subfamilies, the Trombiculinae and the Gahrliepiinae. Descriptions and keys to the identification of the larvae, nymphs and adults of the species of the former subfamily occupy 330 pages while the species of the latter take up 38 pages.

A very helpful illustrated description is given of the characters for identification of these mites, and an explanation is given of the Standard Data of WOMERSLEY and HEASLIP [this *Bulletin*, 1945, v. 42, 324]. The Standard Data form a system of scutal measurements which together with the morphological features are part of the routine description of the larval species of Trombiculid mites. In the present work all Standard Data are expressed statistically and it is noted that significant differences in values may indicate geographical races.

The history of mite systematics, synonymy and the value of certain features of morphology for identification purposes are all discussed and attention is directed to certain opinions published by WHARTON and others in the recent paper in which they stressed the need for a more exact terminology in mite systematics [see this *Bulletin*, 1952, v. 49, 93].

With the aim of clarifying the generic classification and basing it on adult and nymphal characters, specimens from all over the world have been examined. This study has revealed that many of the larval genera which have been proposed cannot be separated in the nymphal or adult stages ; in other words, the Trombiculidae is a striking example of a family having extreme "larval incongruence". Consequently it would be advisable to drop certain generic

names which are based only on larval characters (except perhaps for convenience as subgeneric names). But until more is known of the relationships and taxonomy some larval genera must still be diagnosed on characters, which may ultimately be shown to be of no more than specific value.

Besides the bibliography of 193 references, there is also a list of species and a complete index to the names including the synonyms.

The author is to be congratulated on having brought together so much that was scattered. His hope deserves to be realized that : " the present study will serve as a basis for further and even more intensive work on these mites ".

H. S. Leeson

Weyer, F. Die künstliche Infektion von Kleiderläusen und Mehlkäferlarven mit *Rickettsia conori* (Zeckenbissfieber). [**Experimental Infection of the Body Louse and of Larvae of** *Tenebrio molitor* **with** *Rickettsia conori*] *Acta Tropica.* Basle. 1952, v. 9, No. 2, 170–83, 10 figs.

YELLOW FEVER

Elton, N. W. **Yellow Fever in Panama : Historical and Contemporary.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 436–56, 1 fig. [31 refs.]

" A reorientation of historical source material is necessary before conclusions can be drawn concerning the antiquity of sylvan yellow fever. During the building of the Panama Railroad (1850–1855) yellow fever was singularly absent from the mainland, but during the operation of the first French Canal Company (1881–1889) it took a heavy toll of human lives. After 1889 it remained endemic in Panama City until its eradication by Gorgas in 1905. From 1906–1919 only imported cases developed in the Canal Zone and from 1920 to 1948 no further cases were encountered. Surveys of the human population indicate that sylvan yellow fever has been enzoötic in eastern Panama since 1929.

" In November and December 1948 a wave of sylvan yellow fever began moving westward from this enzoötic center, following the Atlantic rain forest, and reached northern Costa Rica in July 1951. Early in October 1951 an offshoot of this wave had crossed the Cordillera of southern Costa Rica to the Pacific side and has moved eastward again, re-entering western Panama, but now on the heretofore uninvolved Pacific watershed, west of the Canal. The main front of the wave is expected to continue moving into Nicaragua."

Pinto, M. R. Tipos epidemiológicos da febre amarela e os métodos laboratoriais para o seu estudo. [**Epidemiological Forms of Yellow Fever and Laboratory Methods of Study**] *Anais Inst. Med. Trop.* Lisbon. 1951, June, v. 8, No. 2, 275–309, 2 figs. & 3 diagrams. [40 refs.]

Roth, L. M. **Loci of Sensory End-Organs used by Mosquitoes (*Aedes aegypti* (L) and *Anopheles quadrimaculatus* Say) in receiving Host Stimuli.** *Ann. Entom. Soc. of America.* 1951, v. 44, No. 1, 59–74, 6 figs. [18 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, May, v. 40, Pt. 5, 81–2.]

The following conclusions are drawn from the results of experiments in which females of *Aëdes aegypti* (L) and *Anopheles quadrimaculatus* Say were offered a first blood-meal on the human arm and hand, or allowed to react to a warm surface, after various sense organs had been removed. The antennae

and palpi are the chief organs used by *Aëdes aegypti* in locating a host and receiving the stimuli that induce probing. In cages measuring $11 \times 11 \times 15$ ins., the eyes are not needed to find the host. The antennae function as directional distance thermoreceptors and probably as chemoreceptors as well. The palpi receive stimuli when the mosquito is on or near the skin of the host. Temperature receptors are also found on the palpi in *A. aegypti*. Females from which the antennae have been removed are not attracted to man, and removal of both antennae and palpi nearly always abolished probing. The antennae of *Anopheles quadrimaculatus* also receive directional host stimuli from a distance. In this species, a large percentage of females probe even after the removal of both antennae and palpi. The behaviour of the mosquitos indicates that in this species the hind legs may function as sense organs (when the host is near), possibly in detecting air currents or convection currents resulting from the warmth of the host.

DENGUE AND ALLIED FEVERS

Misao, T., Yamaoka, K., Yamada, Y., Ishihara, K. & Kimura, M. **Studies on Dengue Fever.** *Kyushu Mem. Med. Sci.* Fukuoka. 1950, June, v. 1, No. 1, 47–54.

This is an unusual kind of paper ; it consists of a collection of brief summaries of the findings recorded in various papers on dengue by the authors and other workers. References are given to all the original papers but these are in Japanese so that the significance of the different findings can be judged only by workers who can read that language.

A few examples of the findings are as follows : " The virus was present in the patient's blood 60·5 hours prior to, and 5 or 6 days after manifestation of the disease. In swollen lymph glands we found the virus even on the 7th, 8th and 9th day of the disease when the virus was not detected in the blood." " The virus was proved in fresh urine, which had not been retained over 30 minutes in the bladder, until the 14th day of the disease." " *Aëdes albopictus* Skuse conveyed this disease. The patient's blood was communicable to the mosquito from the beginning until the 5th or 6th day of the disease."

The incidence of repeated infection was studied on 7,660 patients in Nagasaki city in the epidemics of 1942, 1943 and 1944 ; second infection occurred in 12·4 per cent., 3rd infection in 0·12 per cent. and 4th in 0·03 per cent. Nearly three-fourths of the 2nd infections occurred after an interval of 2 years.

John W. D. Megaw

Toda, T. & Nakagawa, Y. **Studies on Dengue Fever Virus.** *Kyushu Mem. Med. Sci.* Fukuoka. 1950, Dec., v. 1, Nos. 2/3, 69–73.

The authors state that in 1943 they measured the size of the virus particles of dengue by ultrafiltration with graded collodion membranes. The particle-diameter was calculated to be 15–23 mμ. They also state that in 1943 they found mice to be susceptible to intracerebral inoculation of the virus, which caused paralysis of the legs and death due to myelitis affecting chiefly the anterior horns of the spinal cord.

No mention is made of any previous publication of these findings.

Lyophilized dengue virus kept in a refrigerator was found fully active after storage for 6 years and 8 months. *John W. D. Megaw*

RABIES

Vives Sabater, J. El problema epidemiológico de la rabia en Barcelona desde 1911 a 1948. [**The Epidemiology of Rabies in Barcelona from 1911 to 1948**] *Rev. Ibérica de Parasitología.* 1952, Jan. & Apr., v. 12, Nos. 1 & 2, 69–96 ; 111–203, 26 graphs. [50 refs.]

A comprehensive account of the situation.

Remlinger, P. Une courte épizootie rabique chez des rats d'égout. [**A Short Epizootic of Rabies in Sewer Rats**] *Bull. Acad. Nat. Méd.* 1952, v. 136, Nos. 18/19, 317–18.

The author refers to the previous finding of rabies virus in a sewer rat which had bitten a workman in Tangier [this *Bulletin*, 1952, v. 49, 387]. He now records two more cases in which the virus was detected in such rats about 2 months later. During the succeeding 4 months, 57 more rats were examined, with negative results. It is suggested that there would have been more positive findings, had not the hazard been recognized and rats destroyed energetically. Attention is drawn to the new potential danger of sewer rats to urban hygiene, and the need for prompt measures to deal with it.

H. J. O'D. Burke-Gaffney

Garcia Sanchez, F. & Suarez Torres, G. Un probable caso de rabia en una rata doméstica. [**A Probable Case of Rabies in a Domestic Rat**] *Medicina.* Mexico. 1952, May 10, v. 32, No. 651, 212.

Safford, J. W. **A Rabies Epizoötic in Yellowstone County, Montana.** *J. Amer. Vet. Med. Ass.* 1952, July, v. 121, No. 904, 39–41, 2 figs.

"Ten dogs and 2 cats developed rabies in a period of fourteen weeks. Fourteen human beings were exposed and received prophylactic treatment. There were no human deaths.

"Thirty-two days following the inauguration of the county-wide program, the last case of rabies was reported.

"Twenty-five days following the completion of the mass county-wide vaccination program, the last case of rabies was reported.

"The population of Yellowstone County is 55,760. During the week of March 17 to 24, 1951, 6,048 dogs were vaccinated."

Lapi, A., Davis, C. L. & Anderson, W. A. **The Gasserian Ganglion in Animals dead of Rabies.** *J. Amer. Vet. Med. Ass.* 1952, June, v. 120, No. 903, 379–84, 7 figs. [14 refs.]

"1) Our observations are in accord with those of other workers—that histologic examination of the gasserian ganglion is a valuable adjunct in the diagnosis of rabies, and that the changes are sufficiently characteristic to permit a presumptive diagnosis of rabies when Negri bodies are not demonstrated.

"2) The value of this procedure is enhanced when traumatic destruction or putrefactive changes of the brain substance make examination for Negri bodies unsatisfactory or impossible.

"3) In this study, histological examination of the gasserian ganglion materially reduced the percentage of error of the impression technique."

Lo Siauw Goen. Rabies-vaccin. Vergelijkende dierproeven met formolvaccin volgens van Stockum bereid, gecentrifugeerd formolvaccin en verzwakt levend phenolvaccin. [**Rabies Vaccine. Comparative Animal Experiments with Formol Vaccine Prepared by Stockum's Method, Centrifuged Formol Vaccine, and Attenuated Living Phenol Vaccine**] *Madjalah Kedokteran Indonesia.* 1951, Sept., v. 1, No. 9, 249–54.

A comparison has been made of the antigenicity of 3 different types of rabies vaccine prepared from the brain of a *Macacus cynomolgus* infected with the Paris strain of fixed virus, namely a 10 per cent. suspension inactivated with 0·15 per cent. formol, the same after centrifugation to remove gross particles, and a 20 per cent. suspension with 0·5 per cent. phenol containing living virus. Guineapigs weighing 300 to 350 gm. were immunized with vaccine containing a total of 7 mgm. of brain material, given in the form of daily doses of 0·5 cc. of 0·1 per cent. suspension for 14 days, or of 1 dose of 1 cc. of 0·2 per cent. and 2 doses of 1 cc. of 0·25 per cent. suspension given at intervals of a week. The animals were challenged 30 days after the beginning of vaccination with an intramuscular injection of serial dilutions of a strain of virus adapted to guineapig brain. The vaccinated animals resisted from 23 to 200 LD_{50} of active virus in comparison with unvaccinated controls ; the greatest protection was obtained with phenolized vaccine.

In a second experiment 36 guineapigs were vaccinated with 120 mgm. of brain material given by 6 subcutaneous injections of 1 cc. of 2 per cent. suspension at intervals of 2 days, and after 3 weeks serial dilutions of the challenge virus were inoculated intracerebrally ; little or no protection was observed with any of the 3 vaccines in comparison with unvaccinated controls. A much greater degree of protection was observed with the Habel mouse test ; formol vaccine protected against 8,700 LD_{50}, centrifuged vaccine against 680, and phenolized vaccine against 2,900 LD_{50}. *D. J. Bauer*

Nikolic, M. Die Ergebnisse der Tollwutschutzimpfung beim Menschen nach Wolfsverletzung. [**The Results of Rabies Inoculations in Man after Injuries inflicted by Wolves**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Feb., v. 3, No. 3, 283–96. [14 refs.]

It has been stated in the analysis of the published statistics of the League of Nations that the average mortality from rabies in persons given anti-rabic treatment following wolf bites is 8·7 per cent. This statement is here criticized since there were included in the analysed figures unknown numbers of persons bitten by wolves that may have been perfectly healthy and also persons who gave no clear history of injury.

In the present analysis cases were excluded from consideration if there was no laboratory evidence that the wolf was infected or unless at least one person out of a group of people bitten by one wolf, died of rabies.

Applying these criteria in the analysis of incidents reported by a number of authors suggests that the mortality of rabies in 169 persons injured by rabid wolves was 61 per cent. Interesting accounts are then given of the assaults by rabid wolves on groups of people, in Yugoslavia, Iran and Turkey, who were later given anti-rabic treatment. There was considerable variation in the results following this treatment in the different groups and also in the apparent virulence of the infection, which, as judged by the shorter length of the average incubation period, was greater in the Balkans than in Iran.

Summation of the results from the 3 countries gave a mortality rate of 27 per cent. in 256 persons who had been inoculated. The mortality rate, however, in persons who had been wounded in the head by the rabid animal, was 45 per cent. in the 84 instances.

Discussion of the mechanism of fixed-virus treatment follows this analysis, as well as an account of animal experiments from which it is concluded that the Hempt vaccine is the best prophylactic to use and that it should be given in a single large dose (2·4 gm. of ether-phenolized brain substance) and not in 5 successive fractions. *M. E. Delafield*

Nikolić, M. Tollwuttodesfälle bei Menschen ohne Verletzungen oder Kontakt mit einem tollwütigen oder an Tollwut verdächtigen Tiere. [**Deaths from Rabies in Persons giving no History of Injury from or Contact with Animals shown or suspected to be Rabid**] *Arch. f. Hyg. u. Bakt.* 1952, v. 136, No. 1 ,80–84. [19 refs.]

The author of this paper has collected records in Yugoslavia of 35 cases of rabies in which there was no evidence of injury from or contact with a rabid animal, or even an animal suspected to be rabid. There were 9 such cases in the years 1933 to 1939 and since 1946, 26 other cases have been collected.

Discussion follows on the possibilities of concealment or forgetfulness of an injury, of contact with infected spittle, and of droplet or alimentary infection. The method of infection in these cases is inexplicable but it is possible, judging from this experience and that of other observers, that our knowledge of the spread of the infection is incomplete or erroneous. *M. E. Delafield*

Remlinger, P. Paralysie faciale dite " a frigore " au cours du traitement antirabique. [**Facial Paralysis** *" a frigore "* **during Anti-Rabic Treatment**] *Ann. Inst. Pasteur.* 1952, June, v. 82, No. 6, 756–7.

A case of rabies with mild manifestations, which appeared on the tenth day of treatment and passed off within two weeks thereafter. Apart from slight lagophthalmos, difficulty in whistling and a slight disturbance of taste, the condition was barely perceptible and the characteristic facies was not noticeable in repose. It was not found necessary to suspend treatment.

In view of this relation of the condition to anti-rabic treatment, it is suggested that the so-called *" a frigore "* aetiology of this form of paralysis should not be retained. *H. J. O'D. Burke-Gaffney*

PLAGUE

Englesberg, E. **The Irreversibility of Methionine Synthesis from Cysteine in** *Pasteurella pestis*. *J. Bacteriology.* 1952, May, v. 63, No. 5, 675–80, 1 fig. [13 refs.]

" *Pasteurella pestis*, strain A1122, requires as nitrogen and sulfur sources for growth DL-phenylalanine, DL-valine, DL-isoleucine, DL-methionine, and thiosulfate.

" In the presence of DL-methionine, thiosulfate is replaceable only by either L-cysteine, sulfide, or sulfite, and in the presence of thiosulfate, DL-methionine is replaceable only by DL-homocysteine or L-cystathionine. This dual sulfur requirement is explained by the inability of this organism to synthesize cysteine and methionine from inorganic sulfate by virtue of breaks probably in the conversion of sulfate to sulfite and of cysteine to cystathionine and the lack of an alternate pathway for converting the sulfur of methionine to the S of cysteine.

" A ' spontaneous ' mutant was isolated which utilizes sulfite, thiosulfate, sulfide, or L-cysteine as sole sulfur source, indicating that a gain mutation

probably occurred at the cysteine-to-cystathionine site, thus enabling this mutant to synthesize methionine from any of the above four compounds. The fact that this mutant is still unable to use DL-methionine, DL-homocysteine, or L-cystathionine as sole sulfur source demonstrates the irreversibility of the cysteine-to-methionine synthesis in this organism."

ELBEL, R. E. **Comparative Morphology of some Rat Flea Larvae (Siphonaptera).** *J. Parasitology.* 1952, June, v. 38, No. 3, 230–38, 3 pls.

See also p. 941, KILPATRICK & FAY, **DDT-Resistance Studies with the Oriental Rat Flea.**

FAVORITE, F. G. **Rodent Control by Warfarin on Okinawa.** *Med. Technicians Bull. Suppl. to U.S. Armed Forces Med. J.* 1952, May–June, v. 3, No. 3, 89–96, 3 figs.

The author describes a field test of the efficacy of " Warfarin " in the control of rodents in Okinawa Island. Warfarin is an anticoagulant dicoumarol derivative whose formula is stated to be 3-(alpha-acetonylbenzyl)-4-hydroxycoumarin. The predominant rodents were *Rattus flavipectus* and *R. norvegicus* ; no mention is made of mice.

Baits were maintained and checked daily at 634 " poison stations " in 6 rat-infested areas over periods of 30 days. The total quantity of bait consumed was 52½ lb. containing less than one-quarter ounce of the active ingredient, warfarin, in maize meal. The number of rats found dead was 236 but it was estimated that the total kill was about 600. On the 5th day after laying the baits 2 rats were found dead ; on the following 7 days the numbers found dead were : 5 ; 23 ; 16 ; 19 ; 28 ; 21 ; 7. Thereafter for 8 days the average daily number was 8·25 (range 7–10) and in the last 9 days it was 5·45 (range 1–10).

The quantity of maize-meal bait consumed daily remained fairly constant for the first 8 days (1,340–1,631 gm.) ; it then declined irregularly till the 25th day when it was 250 gm. and during the last 4 days it ranged from 240 to 282 gm.

Constant immigration of rats from surrounding fields made it impossible to hope for complete eradication. It is suggested that warfarin may be found specially useful as a follow-up poison after the initial use of a quick-acting rodenticide such as sodium monofluoracetate [" 1080 "]. The human hazard is said to be " lessened to an acceptable level " while a high degree of chronic toxicity to rodents is maintained.

[References to trials of this poison will be found in this *Bulletin*, 1950, v. 47, 622, and 1952, v. 49, 509, 510. In the 2nd of these references the chemical formula is stated as 3(alpha-phenyl-beta-acetyl-ethyl)-4-hydroxycoumarin.]

John W. D. Megaw

BERVOETS, W. P. & DAMM, A. Effets raticides du " Tomorin ", un dérivé de l'Oxycoumarine. [**Rodenticidal Action of " Tomorin ", a Derivative of Oxycoumarin**] *Ann. Soc. Belge de Méd. Trop.* 1952, Apr. 30, v. 32, No. 2, 113–20.

The following is a translation of the authors' summary :—

1. Tomorin satisfies almost the ideal conditions required of a chemical rodenticide.

2. Its maximum efficacy is only attained when it is spread.

3. It has proved very toxic for *Rattus rattus*, the predominant domestic species in the Belgian Congo, and also for sylvan rodents.

4. It produces a characteristic pathological appearance, which has been observed in 88·7 per cent. of the rats killed during the experiments.

H. J. O'D. Burke-Gaffney

CHOLERA

Gurkirpal Singh & Ahuja, M. L. **A New Test for the Identification of Roughness in** *Vibrio cholerae*. *Indian J. Med. Res.* 1951, July, v. 39, No. 3, 417–21, 6 figs. on pl.

Strains of *V. cholerae* which to all appearances are typically smooth, and agglutinate to titre with smooth " O " cholera serum, are sometimes found to react in varying degree with rough " O " cholera serum also, this indicating partial roughness. Such strains should not be used for the manufacture of cholera vaccine and it is essential to use rough " O " serum for their detection. It had been observed that fresh guineapig serum had a marked vibriocidal effect on rough or partially rough strains while leaving smooth strains unaffected. This action was shown by 80 per cent. of the guineapig serum samples tested. A vibriocidal test was developed as follows :—

An 18-hour peptone water culture is diluted one hundred-fold with the same medium and one part of the dilution is mixed with two parts of 1 in 2 complement (diluent, peptone water). The mixture is incubated for 4 hours at 37°C. The initial inoculum and the growth after 4 hours are then sampled, preferably by plating on agar without spreading, and the results read after 18 hours' incubation, a control without complement being included in the test.

Rough or partially rough strains do not grow or only to a greatly reduced degree as compared with smooth strains which develop normally. This effect is not obtained when the serum has been heated at 56°C. for half an hour. Sera for use in the test should first be selected by trial against known smooth strains. They should not show any inhibitory or vibriocidal effect. The growth obtained is shown in 6 photographs of culture plates. *J. Taylor*

World Health Organization. Technical Report Ser. No. 52. **Expert Committee on Cholera. First Report.** 18 pp. [Refs. in footnotes.] Geneva : 1952, May. [1*s.* 3*d.* ; $0.15 ; Sw. fr. 0.60.]

The Expert Committee on Cholera of the W.H.O. held a first meeting in Delhi in November 1951 to consider several aspects of the cholera problem including the work of the Joint Study Group which had been constituted by the *Office International d'Hygiène Publique* and the W.H.O., the results of which have already been largely published in W.H.O. Technical Report No. 18 [this *Bulletin*, 1951, v. 48, 549]. The following subjects were discussed :—

Technique of examination of stools and water for the presence of V. cholerae.—The value of Bandi's test for a rapid diagnosis of cholera had been compared with that of the accepted cultured methods. (The test consists of the inoculation of stools into a peptone water medium containing high-titre O cholera serum. A granular precipitation occurs on incubation if growth of *V. cholerae* takes place.) As the ordinary cultural methods gave 38 per cent. more positive results the test was not recommended for adoption.

Agglutination response for retrospective diagnosis.—On the findings presented in Technical Report No. 18 it was considered that the usefulness of such tests had not been established.

Serological studies on V. cholerae.—The suggestion of one member of the joint meeting of the Cholera Advisory Committee of the Indian Council of Medical Research and the Expert Committee of the W.H.O. that the non-haemolytic vibrio, with the specific O antigen defined by GARDNER and VENKATRAMAN, may not be the only form causing epidemic cholera was not accepted by the meeting. It was considered that " the present definition of the cholera vibrio though incomplete, was sufficient for practical purposes ". The advisability of studies on the " rough " character of the vibrio was suggested. A new method proposed for use in identifying roughness in *V. cholerae* was noted [see above (1952) p. 949].

Cholera research centre.—The Committee recommended the formation of a centre for continuous study of the cholera problem which would also act as a vibrio reference laboratory. Vibrio strains should be studied from the point of view of their epidemiological significance, advantage being taken of phage typing for the purpose.

Presence, persistence and virulence of V. cholerae in stools of convalescents and contacts.—The results of an investigation into the excretion of the vibrio which had been carried out in Calcutta in 1950 under the auspices of the *Office International d'Hygiène Publique* but which have not yet been published were available to the meeting. Out of 113 convalescents continuously observed until 5 or more successive daily negative cultures had been obtained, 71·6 per cent. were negative after the first week, 89·3 per cent. after two weeks and 98·1 per cent. after three weeks. The longest period of continuous daily excretion of *V. cholerae* was 15 days and the longest period of intermittent excretion 25 days. In 5 of the cases the vibrio isolated at subsequent examinations was of different serological sub-group (Inaba or Ogawa) from that originally present. This was presumably due to reinfection in the hospital wards. It was therefore concluded that " re-infection and cross-infection cannot be ruled out as a cause of prolonged and irregular excretion in hospitals, quarantine camps, and in endemic areas ".

The Committee considered that the results of these investigations and other data showed that the presence and persistence of the vibrio in stools was as a rule of short duration and intermittent. The possibility of longer periods of excretion in a few cases could not be ruled out. This was in accordance with views previously accepted. " The committee found that so far no conclusive evidence was available as to whether or not and to what extent the vibrios excreted by convalescent and contact carriers tend to be rough and to have an altered virulence ".

Epidemiological importance of cholera carriers.—The discussion on this point brought out the fact that workers in India and the Far East considered that convalescent and contact carriers were of no epidemiological importance. Reference was made to the observation of NICHOLLS on carriers of *V. cholerae* entering Ceylon. He had estimated that at least 200 carriers entered Ceylon annually during the years 1924–33. There were only 10 occurrences of cholera in the period, of which 9 were traced to incubatory carriers ; the tenth was untraced. Observers in Egypt during the 1947 epidemic did, however, consider that the contact carrier may play a rôle in the spread of the disease. " The trend of opinion in the committee was to the effect that contact carriers do not play a significant role in the spread of the infection."

Possible role of fish and aquatic animals in the preservation and spread of cholera infection.—The paper by PANDIT and HORA on this subject has already been abstracted [this *Bulletin*, 1951, v. 48, 1106]. The Committee considered that any investigation on the matter which may be planned should include both field and laboratory studies.

Importance of a general programme of environmental sanitation in the campaign against cholera.—A report on the possibilities of implementing programmes for environmental sanitation in cholera-endemic areas, which has not yet been published, was before the Committee. In the report the point is stressed that schemes, to be practicable, should be adapted to the financial resources, habits and level of health consciousness of the people. There was evidence that measures can be adopted which will help materially to reduce the incidence of cholera.

" Considering this report and realizing that good sanitation is the most effective method of cholera prevention, the committee urged that all authorities concerned should continue studying possibilities for the improvement of environmental sanitation in areas where cholera is endemic, particularly the use of methods applicable with local materials and at a cost within the economic possibilities of the areas concerned. Health education should form an integral part of the programmes contemplated.

" In the opinion of the committee even partial programmes, if persisted in for long periods, will yield good results by stimulating the interest of the people to such a degree that they will be ready to shoulder the entire outlay for the work and will demand an extension of the programme. The committee stressed the urgency of initiating environmental sanitation programmes in both urban and rural localities where cholera is endemic."

Cholera field work.—The Committee referred to the statistical studies made on the problems of endemicity now in progress. Investigations had shown the need for delimiting accurately the areas at which prevalence at different levels exists, and that marked differences exist in this respect even between quite small adjacent districts. Further studies to elucidate the reasons for such differences should shed additional light on the epidemiology of cholera. An exact determination of the real endemic foci would be of value for the initiation of rational control measures.

An annexure to the Report gives the method of preparation and use of a tellurite medium for differential isolation of *V. cholerae* which has been under trial. *J. Taylor*

Chun, D. **Studies on Cholera-Red Reaction. II. A Supplement to the Knowledge concerning the Mechanism of Cholera-Red Reaction.** *Yokohama Med. Bull.* 1951, Oct., v. 2, No. 5, 286–97. [13 refs.]

Chaudhuri, R. N., Chakravarti, H. & Dutta, B. N. **Estimation of Extra-Cellular Fluid by Thiocyanate in Healthy Indians.** *Indian J. Med. Res.* 1951, Oct., v. 39, No. 4, 553–8. [12 refs.]

Chaudhuri, R. N., Chakravarti, H. & Dutta, B. N. **Body-Fluid Changes in some Acute Febrile Conditions.** *Indian J. Med. Res.* 1951, Oct., v. 39, No. 4, 571–82.

Chaudhuri, R. N., Chakravarti, H. & Dutta, B. N. **Studies on Body-Fluid Changes in Cholera.** *Indian J. Med. Res.* 1951, Oct., v. 39, No. 4, 559–69, 1 graph. [10 refs.]

" 1. Plasma volume, blood volume, available thiocyanate space, plasma chloride, etc., were determined in 27 cases of cholera on admission, out of which 10 succumbed and 17 survived. Repeated estimations were done in 8 of the survival cases on their recovery.

" 2. Plasma volume per kilogram was below the line of normal regression in all the cases. In fatal group there was a reduction of 32 per cent of the mean normal value. In the survival group reduction was 20·6 per cent.

" 3. Change in the interstitial fluid in the survival group was less marked but in the fatal group the mean value was 39 per cent reduced.

" 4. Percentage value of plasma chloride was within normal limit or slightly raised in all the cases. The total quantity of the circulating chloride, however, was markedly decreased in all the cases, especially so in the fatal group. In the follow-up cases all the body-fluid and the cellular changes were corrected with recovery and it seems some of them were over-corrected due to excessive saline infusion.

" 5. Significance of the changes observed and their bearing on the clinical course of the disease are discussed."

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

ANDERSON, H. H., CONTOPOULOS, A. N. & ANDERSON, Jeanette Van D. **Current Status and Therapy of Amebiasis in the Arab East.** *J. Roy. Egyptian Med. Ass.* 1952, v. 35, No. 4, 225–38. [15 refs.]

The incidence of amoebiasis (" systemic infection with *E. histolytica* ") in Egypt has variously been assessed as being from 11·5 per cent. infected (in 1917) to 85 per cent. infected (in 1951) among various communities by different workers during the last 33 years. The authors have made a survey of its incidence in selected areas of Lebanon and of Saudi Arabia.

In Lebanon, 20 of 188 students, 7 of 32 workers at the University, 18 of 172 members of the staff of their families, and 4 of 14 hospital patients, were found to harbour the infection. The over-all incidence of infection in these groups was 12·0 per cent. ; there were 20 patients infested with small cyst-producing, and 30 with large cyst-producing, strains of the parasite. These figures are based on 3 stool examinations of each person.

In Saudi Arabia, persons from two tribes of Bedouins were examined, only one specimen of stool being obtained from each patient. Of the 99 individuals so examined 24 were found infected : 11 of them harboured large cyst-producing, and 13 small cyst-producing, strains of parasites. As this number of infections was found on one stool examination it may be assumed that the true incidence of infection was at least twice this ; therefore about 35 per cent. of these desert people harboured *E. histolytica* infections.

The conclusions reached by the authors are that amoebiasis is very prevalent in Egypt, where it constitutes a major public health problem ; in Lebanon its incidence is about that in the United States ; and in Saudi Arabia it is about three times that in the United States. Acute dysentery and amoebic hepatitis are much more frequent in Egypt than in the other two countries, where asymptomatic infection is the rule.

After reviewing some recent reports on the therapeutic value of the newer amoebicides the authors record some results of the treatment of patients in Beirut with thiocarbarsone, terramycin, or fumagillin. The last-named they consider to show promise as a " potent, direct-acting amoebicide ", though its true place in anti-amoebic therapy has still to be determined.

In regard to the control of the infection by public health measures they believe that this would be particularly difficult in Egypt, as here there is a single source of water for all purposes ; it would be easier in Lebanon where there are multiple sources of mountain water supply ; but it presents greater problems in Saudi Arabia owing to the lack of sanitation among the desert tribes.

A. R. D. Adams

LAMY, L. & LAMBAULT, E. Milieu type pour la culture des protozoaires parasites des voies digestives. Intérêt au point de vue du diagnostic coprologique. [**Standard Medium for Cultivation of Intestinal Protozoa : Its Use in Coprological Diagnosis**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 2, 186–9.

The authors have found that a single medium can be employed successfully for the cultivation of almost all the human intestinal protozoa. For this purpose they use Dobell and Laidlaw's semisolid medium, the solid phase of which consists of a coagulated horse serum slope (2 cc. per test tube), covered with 1 part horse serum plus 7 parts Ringer's fluid (5 cc. of the mixture per tube), and rice starch (10–20 mgm. per tube). [This is Dobell's " HSHs+S " medium.]

The following is a list of protozoa (with incubation temperatures in brackets), which the authors have grown in this medium : *Entamoeba histolytica* (37°C.), *E. coli* (37°C.), *Endolimax nana*, *Iodamoeba bütschlii*, *Entamoeba gingivalis*, *Trichomonas hominis* (25°, 37°C.), *T. elongata*, *Chilomastix mesnili* (37°C.), *Enteromonas* and *Cercomonas* (both 37°C.), *Bodo caudatus* (25°C.), *Balantidium coli* (25°, 37°C.). The only protozoon which cannot be cultivated in any medium is *Giardia intestinalis*.

Among the intestinal parasites of lower animals the following were cultivated in the same medium : *Entamoeba invadens* of reptiles, *Trichomonas* of rat, guineapig, pig and monkey, and *Histomonas* of poultry.

It is stated that this medium is of particular value for the diagnosis of intestinal protozoal infections in man, when the number of parasites in the stool is too small for detection in faecal preparations.

[Though there can be no doubt about the diagnostic value of faecal cultures in amoebiasis, they should be regarded only as a supplementary method, for the reviewer has frequently failed to cultivate *E. histolytica* from stools containing fair numbers of cysts or trophozoites or both of this parasite.]

C. A. Hoare

LAARMAN, J. J. **New Methods of Concentrating Amoebic Cysts in Faeces.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, Mar., v. 4, No. 1, 9–11.

Some 30 years ago BAYER devised a method for concentrating amoebic cysts from faeces, which was later improved by SCHÜFFNER, but remained unpublished. The present author made comparative tests of the 2 methods, and found that Schüffner's method—with slight modification—was superior to the other.

Schüffner's modified method is as follows :—

(*a*) A sample of faeces, the size of a pea, is suspended in a few ml. of water in a centrifuge tube ;

(*b*) The tube is filled to about 2 cm. below the top with a twofold concentration of Bayer's fluid (solution in 420 cc. distilled water of concentrated acetic acid, 4 cc. ; camphor water, 150 cc. ; formalin, 30 cc. ; copper acetate, 0·6 gm. ; and copper chloride, 0·6 gm.) and shaken vigorously [this *Bulletin*, 1922, v. 19, 625] ;

(*c*) A thin layer of petrol (0·5–1 cm.) is added to the suspension, and the tube is again shaken vigorously (originally Bayer used ether) ;

(*d*) The tube is left to stand until all particles rise to the surface : they are removed from the surface by tipping over with a quick movement, leaving a clear fluid in the tube ;

(*e*) The tube is centrifuged and the sediment is examined microscopically.

Schüffner's method was used for concentrating the cysts of *Entamoeba histolytica* and *E. coli*. *C. A. Hoare*

McDearman, Sara C. & Dunham, W. B. **Complement Fixation Tests as an Aid in the Differential Diagnosis of Extra-Intestinal Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1952, Mar., v. 1, No. 2, 182–8. [13 refs.]

The difficulties in the diagnosis of extra-intestinal amoebiasis are considerable. An effective serological test should give positive results in extra-intestinal infections, but negative results when the infection is confined to the intestine. After considering the antigens and complement-fixation tests already described in the literature, the authors decided that the standardized procedure devised by Kent and Rein (*Science*, 1946, v. 103, 598) and Kent, Bukantz and Rein (*Jl. Immunol.*, 1946, v. 53, 37) and evaluated by Hussey and Brown [this *Bulletin*, 1950, v. 47, 981] would best suit this purpose.

The antigen employed was a commercial one ; it was prepared from amoebae grown in a Cellophane sac, being by this means separated from the basic medium. Lyophilized guineapig complement and rabbit anti-sheep haemolysin were also obtained commercially. The sera under test were removed from the clot within 24 hours of the taking of the blood. A test was considered positive if there was 50 per cent. haemolysis or less in a tube containing 1 : 2 or any higher dilution of the serum under test.

With this technique, complement deviation tests were done on 2,592 persons, all but 263 of whom were hospital patients in Tennessee. The 263 were members of the hospital staff. The cases were divided into 3 groups : (*a*) those with extra-intestinal infections with or without intestinal symptoms (22 cases) ; (*b*) those with solely intestinal involvement (187 cases) ; and (*c*) those with no symptomatology attributable to amoebiasis (2,383 cases). Stool examinations were not done on most of the last group, but no patients already known to harbour the parasite were included in it.

Positive tests were given by 19 of the 22 patients in group (*a*) ; the titres ranged from 1 : 2 to 1 : 256, the latter being the highest serum dilution used. Of these 22 patients, 5 had liver abscesses, 4 had involvement of the liver short of abscess formation, and 13 had both liver and lung involvement ; one of each of these 3 series gave a negative complement deviation test. The earliest positive test in a case of liver involvement was observed one month after the onset of symptoms ; in another case the test was negative until the 10th week ; and in yet another it was negative until the 8th week, but by the 11th week there was a significant rise in titre. Specific therapy was not followed by any sudden drop in titre, though in some cases observed for 6 months it gradually fell during this period.

Of the 2,329 [2,592–263] sera from actual patients 67 (3 per cent.) gave positive tests. Of these 67, 19 (28 per cent.) suffered from extra-intestinal amoebiasis, 32 (48 per cent.) had solely intestinal amoebiasis, and 16 (24 per cent.) had no evidence of amoebiasis. An analysis of the 51 positive sera from cases of all types of amoebiasis shows that 19 of them (37 per cent.) had extra-intestinal infections. Thus 82 per cent. of the authors' series of cases of extra-intestinal amoebiasis gave a positive complement deviation test ; and 15 per cent. of their cases of solely intestinal infection also gave a positive test.

The authors conclude that the test is of value in the diagnosis of extra-intestinal amoebiasis, and that its comparative insensitivity in solely intestinal amoebiasis enhances its value. A more desirable antigen would be one which when used in high concentration would reveal the intestinal infections, and

which when used in low dilutions would eliminate these but would reveal the extra-intestinal infections. *A. R. D. Adams*

CHAKRAVARTI, A. **Pulmonary Amoebiasis.** *J. Indian Med. Ass.* 1952, June, v. 21, No. 9, 387–95, 16 figs. on 4 pls. [17 refs.]

In amoebiasis, pulmonary involvement is considered rare.

This paper is based upon a study of 12 cases. Pulmonary amoebiasis is divisible under 3 categories—symptomatic, secondary and primary. The liver is held to constitute the chief portal of entry and the entamoeba may reach the lung substance, either by a process of continuous and contiguous spread through the diaphragm, by transdiaphragmatic lymphatic spread, or by veno-arterial carriage from the liver to the lung.

In the primary variety, in the absence of obvious hepatitis or liver abscess, infection is supposed to reach the lung from a chronic amoebic intestinal ulcer by embolism.

In the symptomatic variety, actual lung tissue involvement does not occur and therefore it cannot be demonstrated radiologically. The manifestations are due to basal pleural involvement and it has been suggested that 15–25 per cent. of patients with hepatic abscess manifest thoracic symptoms.

In secondary pulmonary amoebiasis the clinical condition is one of basal involvement of the right side of the chest and is characterized radiologically by a triangular pneumonic opacity.

In primary pulmonary amoebiasis the liver is not involved and the homogeneous opacities in such cases closely resemble those of pulmonary tuberculosis.

In cases where the clinical evidence points to pulmonary amoebiasis sputum, mounted in saline, must be searched for motile entamoebae immediately after expectoration. In the present series they were detected in 7 out of 12 cases. In those cases in which the sputum does not reveal the entamoebae, differential diagnosis has to be made from virus pneumonia.

Treatment in this series was either with emetine or chloroquine. Patients receiving emetine had 15 gm. in 21 days. Where chloroquine was used alone a total of 36 tablets was given. Clinical response to chloroquine was appreciable earlier and was more complete than with emetine.

The majority of patients were adults, though one was a child and another a man of advanced age. All were males, except one.

Duration of illness varied from 1 week to 3 months. Fever usually was of the low-grade type without conforming to a set pattern. A troublesome cough producing thick, viscid non-purulent sputum was one of the main symptoms. The chief complaint was pain in the lower part of the right side of the chest. The blood picture was neither constant nor characteristic. Only some cases showed moderate leucocytosis with polymorphocytosis.

It is said that entamoebae are so frequently met with in stools that no clinical importance could be attached to such findings.

As regards radiological appearances right lower zonal pneumonic opacity was seen in only 5 cases. In 3 instances there was patchy involvement of the left lung in addition. In two the left dome of the diaphragm presented apical pointing. In one the opacity was at the cardiophrenic angle which merged on to the cardiac border without alteration of the diaphragmatic leaf. One other simulated right upper zonal lung abscess.

[This paper is illustrated by 16 figures of lung radiographs which, though basically informative, are not well reproduced. Other findings are shown in 3 tables.] *Philip Manson-Bahr*

Breuil, M. Traitement de l'amibiase par le "Direxiode". [**Treatment of Amoebiasis by "Direxiode"**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 2, 193–5.

"Direxiode" [an iodo-hydroxyquinoline compound for oral administration which contains 69·9 per cent. of iodine, see this *Bulletin*, 1952, v. 49, 863] has been used in the treatment of 54 cases of amoebiais in Morocco. Twenty of the patients were adult Europeans ; 4 were European children, and 30 were adult Moroccans. The dosages employed were 10 tablets or 7 tablets daily, according to whether there were symptoms or not, until 180 to 200 tablets had been taken. Each tablet contains 0·21 gm. of the active product *Ibid.*, 1951, v. 48, 153]. The dosage was suitably adjusted for children. The treatment was repeated after one week's interval, and again after another 3 weeks' interval. There was no evidence of iodism or of intolerance to the drug, which was considered to be an effective and safe amoebicide. [The number of patients sterilized of their infections is not clearly stated.]

A. R. D. Adams

Vielle, A. Note à propos du traitement de la dysenterie amibienne par la terramycine. [**Observations on the Treatment of Amoebic Dysentery with Terramycin**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 2, 190–93.

Terramycin has successfully been used in Paris for the treatment of amoebiasis. It appears to be a satisfactory drug in the cases of amoebiais deriving from North Africa, and it has proved superior to aureomycin in such cases. Terramycin does not invariably cure amoebiasis ; nevertheless it is a valuable additional weapon to this end ; it is easy to give, it causes no preliminary reaction, and it is devoid of any toxic side-effects such as those associated with emetine and conessine. To obtain the best results it should be given in conjunction with the recognized amoebicidal drugs until its value is more clearly defined.

A. R. D. Adams

Wilmot, A. J., Armstrong, T. G. & Elsdon-Dew, R. **Aureomycin in Amebic Liver Abscess.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 429–35. [19 refs.]

"Five cases of amebic liver abscess in male Africans in which characteristic pus was obtained were treated with Aureomycin in a dose of 500 mgm. 6 hourly for 10 days.

"In two cases there was no response, in two cases possibly some response, and in one case an apparently good result was followed by recurrence in six weeks.

"The results have been compared with those obtained in similar cases with emetine and chloroquin diphosphate and it is concluded that Aureomycin is a much less effective drug."

Shaffer, J. G. & Washington, J. E. **Failure of Two Strains of *Endamoeba histolytica* to develop Resistance to Amoebacidal Agents *in Vitro*.** *Proc. Soc. Exper. Biol. & Med.* 1952, May, v. 80, No. 1, 63–4.

"Two strains of *E. histolytica* failed to show evidence of the development of resistance to aureomycin, terramycin or emetine HCl after 38 serial transfers in S-F medium containing partially effective concentrations of the agents."

Lenczner, M. & Dubash, J. **Sensitivity of *Entamoeba histolytica* to Aureomycin *in Vitro* and Aureomycin Blood Levels after Oral and Rectal Administration.** *Indian Physician.* 1952, June, v. 11, No. 6, 123–6.

Helo, J. E. Investigaciones de parasitos y cuerpos extraños en la luz del apendice. 153 observaciones. [**Parasites and Foreign Bodies seen in 153 Extirpated Appendices**] *Rev. Facul. de Med.* Bogotá. 1952, Jan., v. 20, No. 7, 399–412.

The specimens were examined as soon as possible after removal, never more than 2 hours, without addition of any preservative. The lumen was slit with a bistoury and examined macroscopically ; the mucosa was then scraped and the débris examined in distilled water or saline with a dry lens. The findings of each of the 153 specimens are given and the following is a summary : *Entamoeba histolytica* found in 9 and its cysts in 3 ; *E. coli* in 4 and its cysts in 5 ; *Giardia* cysts in 4 ; *Blastocystis* in 2 ; ova of *Ascaris* in 35 (the author did not find any adults, though, as he says, surgeons have reported them) ; *Trichuris* ova in 28, adults in 2 ; hookworm ova in 5 ; *Strongyloides* larvae in 2 ; *Enterobius* ova in 1, adults in 3 ; *Taenia saginata* ova in 1 ; coproliths in 24 ; other foreign bodies were found on 2 occasions, one was a bristle of a tooth-brush, the other a fragment of a bean husk. Multiple parasitism was not rare ; one had ova of *Ascaris* and hookworm, *E. coli* and its cysts and *Giardia* cysts ; another had *E. histolytica* and *E. coli* and ova of hookworm and *Trichuris*. [For some reason, not known to the abstracter, the author's summary gives all the positives as negative.] *H. Harold Scott*

Ansari, M. A. R. Contribution à l'étude du genre *Giardia* Kunstler, 1882 (*Mastigophora : Octomitidae*). I.—Tableau synoptique des espèces connues et de quatre espèces nouvelles. [**Study of the Genus *Giardia*. I. Synoptic Table of Known Species and of Four New Species**] *Ann. Parasit. Humaine et Comparée.* 1951, v. 26, Nos. 5/6, 477–90, pl. 1 & 1952, v. 27, No. 4, 421–79, pls. 2–9. [151 refs.]

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Baltazard, M., with the collaboration of M. Bahmanyar, R. Pournaki & C. Mofidi. *Ornithodorus tartakovskyi* Olenev 1931 et *Borrelia* (*Spirochaeta*) *latychevi* Sofiev 1941. Note préliminaire. [*Ornithodorus tartakovskyi* **and** *Spirochaeta latychevi*] *Ann. Parasit. Humaine et Comparée.* 1952, v. 27, Nos. 1, 2 & 3, 311–28, 7 figs.

A description of *Ornithodorus tartakovskyi* collected from burrows of rodents in the neighbourhood of Meshed, Persia, and also of the spirochaete with which it is infected, *S. latychevi*. This tick was originally described by Olenev, 1931, from specimens found in the burrows of tortoises in Uzbekistan, and seems to be widely distributed through Central Asia. It is a small species allied to *O. tholozani*, with which it was first confused. It lives in desert regions and in the laboratory its optimum temperature was found to be 27°C. ; excessive humidity is harmful. The cycle from egg to adult was found to be about 3 months, and there are usually 4 nymphal moults.

The authors collected 56 lots of these ticks, mainly from burrows of the rodent *Meriones*, and 7 lots were found to be infected with *Spirochaeta latychevi*. The ticks produced infection by their bite, when fed on white mice or newly-born rabbits. Hereditary infection was observed in eggs laid by a naturally infected individual.

Newly-born rabbits were found to be easily infected either by the bites of infected ticks or by the inoculation of blood containing the spirochaetes. The incubation period is about 5 to 7 days when infection is produced by ticks but only 3 to 4 days after blood inoculation. The first attack is fatal in about 70 per cent. of the animals, with splenomegaly, anaemia and rarely haemoglobinuria. The numbers of spirochaetes in the blood may reach 50 per field. The average duration of the first attack is about 7 days, and may be followed by one or more relapses.

The adult rabbit is comparatively resistant and only shows a very slight infection.

The newly-born guineapig, as well as the adult, is almost completely resistant to infection, which constitutes a very marked difference from all other known species of relapsing fever spirochaetes.

The white rat to some extent resembles the rabbit in its susceptibility, the newly-born being much more easily infected, but the number of spirochaetes in the circulation is fewer than in the rabbit.

The white mouse is susceptible but the number of spirochaetes in the first attack averages only 1 per field and in any relapses is 1 per 500 fields or even fewer. Mortality is nil.

Wild rodents would seem to be the obvious reservoirs of this infection, but the examination of 192 *Meriones libycus* and of 12 hamsters, *Cricetulus migratorius*, gave negative results. Experimentally, *Meriones libycus* was found by Pospelowa-Shtrom to be readily susceptible, but the present authors obtained only a very slight infection with the bites of infected ticks. Two other species of rodents, *Microtus arvalis* and *Rhombomys opimus*, were also infected experimentally. On the other hand the common *Citellus fulvus* was found to be completely resistant.

Ten human patients, two inoculated with blood containing spirochaetes, and 8 bitten by infected ticks, showed no rise in temperature and the blood remained negative. On the other hand 5 cc. of blood collected from 4 of these patients produced infection in newly-born rabbits, and this " inapparent " blood infection has been found up to 31 days after the bite of infected ticks.

Attempts were made without success to transmit *Spirochaeta latychevi* by other species of ticks including the small and large varieties of *Ornithodorus erraticus*, *O. tholozani*, *O. moubata* and the North American species of *Ornithodorus*. At present this spirochaete seems to be transmitted only by its specific vector *O. tartakovskyi*. *E. Hindle*

Bertazzi, C. G. Schemi di terapia della febbre ricorrente africana dell'altopiano etiopico. [**Treatment of Relapsing Fever in the Abyssinian Highlands**] *Acta Med. Italica.* 1952, Mar., v. 7, No. 3, 57–62. [48 refs.] English summary.

The author claims to have treated a large number of cases of louse-borne relapsing fever in both Africans and Europeans, but he does not give any figures. He details his treatment for (1) the febrile attack, (2) the period of remission, (3) relapses, and (4) complications occurring either during the illness or during convalescence.

He treats the febrile attack by the intravenous administration of glucose solution containing neosalvarsan, sympathol [a synthetic sympathomimetic drug] and ascorbic acid. The ascorbic acid aims at raising the tolerance for the arsenical preparation. Sympathol has been found free from the side effects (tremors, chills, etc.) which sometimes accompany the administration of adrenaline. The solution is given at 37°C.

After the crisis the patients were given an 8-day course of sodium cacodylate with ascorbic acid and a preparation of lecithin. The Africans had this treatment by the intravenous route, the Europeans by the intramuscular.

Then followed 2 more, decreasing, doses of neosalvarsan at 8-day intervals. Relapses were treated as for the first febrile attack.

After the complete course of neosalvarsan, treatment with sodium cacodylate was given for another 8 days ; some Europeans were given Fowler's solution instead. The treatment was finished off with calcium gluconate intravenously.

The native Africans have been found to tolerate the arsenobenzol and the cacodylate preparations better than the Europeans and were given higher doses. Some of the Africans showed a lingering low fever, which subsided after a further short sharp treatment with neosalvarsan.

Headaches, when persistent, cleared up after lumbar puncture. Other complications dealt with included nose bleeding during the attacks and during convalescence, diarrhoea, vomiting and cardiac failure.

The association of malaria and of louse-borne typhus with louse-borne relapsing fever are discussed. A case of the latter combination is dealt with in some detail. *J. Cauchi*

Sergent, Ed. & Poncet, A. Longues infections latentes, accompagnées de prémunition, dans la fièvre récurrente hispano-nord-africaine expérimentale du cobaye, 4e note. [**Long Latent Infections, Accompanied by Premunition, in Experimental Spanish-North-African Relapsing Fever in the Guineapig**] *Arch. Inst. Pasteur d'Algérie.* 1952, Mar., v. 30, No. 1, 11–30, 12 figs. [15 refs.]

The authors used a strain of *Spirochaeta hispanica* isolated in 1933 and subsequently maintained in guineapigs by passages on an average every fortnight. The present paper gives details of the persistence of latent brain infections, and in one case the brain was found to be infective more than 3 years after the original infection. Guineapigs carrying these latent infections were found to be resistant against reinfection when inoculated with the same strain of spirochaetes, up to intervals of at least 3 years and 5 months after the primary infection. *E. Hindle*

Bijlmer, J. **The Susceptibility of *Spirillum minus* and *Borrelia duttoni* to Streptomycin and Penicillin.** *Antonie van Leeuwenhoek : J. Microbiol. & Serol.* 1952, v. 18, No. 3, 246–50.

" An investigation into the effect of streptomycin and penicillin on *Spirillum minus* infections in mice, guinea pigs and hamsters, showed that streptomycin effectively controlled *Spirillum* infections in guinea pigs, but that this antibiotic was not always efficacious in mice and hamsters. Penicillin, when given in rather high dosages seemed to be more reliable.

" Both antibiotics were absolutely inadequate for the control of *Borrelia duttoni* infections in mice."

YAWS

Barnard, C. C. **Yaws and Flies. Past and Present Opinions on the Rôle of Flies in the Transmission of Framboesia Tropica.** *J. Trop. Med. & Hyg.* 1952, May & June, v. 55, Nos. 5 & 6, 100–114 ; 135–41. [Numerous refs.]

This very useful and carefully prepared paper is divided into a review of the literature and an analysis of 43 replies to a questionary as to what are the

chief factors in yaws transmission, and what part flies play in it. In the first part 154 citations are made, of which 86 are based upon observation and the statements of indigenous peoples.

The earliest record is by Gabriel Soares DE SOUSA (1587) which is at the same time probably the earliest reference to insect vectors in any disease. Where references have seemed important or interesting the author has quoted them verbatim or in English translation. These reports come from most countries in which yaws is present but few give any sound evidence that insects transmit yaws. Exceptions are the work of KUMM *et al.* on *Hippelates* [this *Bulletin*, 1935, v. 32, 885, 886 ; 1936, v. 33, 960, 961] in Jamaica, and LAMBORN on *Musca sorbens* in Nyasaland [*ibid.*, 1937, v. 34, 964].

Only about 12 authors regard insects as a frequent means of yaws transmission, and of these only 8 regard it as the most frequent.

In the second part 35 replies to the first question are reported and analysed. It was generally agreed that direct personal contact plays a great part ; overcrowding and contact between mother and child were also considered important by some. Of 37 replies concerning insect transmission, in 10 it was regarded as important, in 13 as unimportant, in 9 it was stated that there was no evidence and in 5 the reply was indefinite. The author concludes from his information that " various species of flies can and do act as mechanical vectors of yaws in most parts of the tropics, but the extent to which this is an important or even common mode of dissemination is uncertain and probably varies in different localities ".

[This is a valuable paper which badly needed writing, and it has been well written. Most workers will agree with the author's conclusion. There is a great need for further careful field and laboratory work to assess the part played by insects in yaws transmission. It would be strange if, after 365 years, it were found to be important.] *C. J. Hackett*

INNELLA, Filomena. **Reactivity of Cardiolipin Antigens : in Yaws and in a Random Group of Serums.** *U.S. Armed Forces Med. J.* 1952, June, v. 3, No. 6, 917–21.

Of 13,084 " random " specimens of serum 274 showed some reactivity with cardiolipin microflocculation antigen ; the latter were then submitted to the VDRL test and the cardiolipin complement-fixation test (CFT) ; of 145 specimens positive with the cardiolipin microflocculation 134 were positive and 11 doubtful with the VDRL ; of 129 doubtful with the former, 16 were positive, 66 doubtful and 47 negative with the latter. Of the 145 sera positive with the cardiolipin microflocculation test, 129 were positive, 4 doubtful, 11 anti-complementary and 1 negative with the cardiolipin CFT ; of 129 doubtful with the former, 43 were positive, 36 doubtful, 8 anti-complementary and 42 negative with the latter. In the case of 315 sera from patients with yaws, all positive with the cardiolipin microflocculation test, 310 were positive and 5 doubtful with the VDRL test, and 303 positive, 7 doubtful, 4 anti-complementary and 1 negative with the cardiolipin CFT. Of 40 specimens doubtful with the cardiolipin microflocculation test, 2 were positive, 33 doubtful and 5 negative with the VDRL test, and 5 positive, 10 doubtful, 1 anti-complementary and 24 negative with the cardiolipin CFT. Of 20 sera negative with the cardiolipin microflocculation test, 3 were doubtful and 17 negative with the VDRL test, and 2 positive, 2 anti-complementary and 16 negative with the cardiolipin CFT.

Thus there was considerable agreement between the three tests in the yaws sera but much disagreement in the case of the " random " specimens ; the

order of reactivity of these tests is : cardiolipin microflocculation first, VDRL second and cardiolipin CFT third. *T. E. Osmond*

Hackett, C. J. **Bone Lesions of Yaws in Uganda.**
This book was reviewed on p. 741.

LEPROSY

Tisseuil, J. De la lèpre. [**Leprosy**] pp. xii+159, 24 figs. & 2 charts. 1950. Paris : Arnette, 2, Rue Casimir Delavigne. [Fr. 650.]

The author first went out to the French Overseas Territories long ago when there were none of the modern conveniences for living and travel, and where he performed the functions of doctor, administrator, judge and protector of the indigenous people. The book covers all the usual divisions of the subject commonly discussed in a textbook on leprosy ; it does not aim at being a treatise but rather gives the personal experiences and reflections of the author. As an example, writing of the Mitsuda test he says that the negative reaction in cutaneous [lepromatous] leprosy is specific when the antigen is injected *subcutaneously*, seeing that the paratubercle bacillus and the bacillus of rat leprosy when used similarly as antigens give positive reactions. The usual Mitsuda reaction given by intradermal injection of the antigen and reacting positively in maculo-anaesthetic cases is not a sign of immunity or partial immunity to leprosy, as a positive reaction is also obtained when the antigen is composed of rat leprosy bacilli or paratubercle bacilli, and a similar positive reaction is also obtained, when the usual Mitsuda antigen is injected intradermally, in a certain proportion of those who have never had any contact with leprosy. The author finds an immediate reaction which lasts some 9 days when Mitsuda's antigen is injected subcutaneously under tuberculoid macules, but this immediate reaction is absent when the same injection is made in the spaces between the macules.

The author, when in New Caledonia in 1928, thought of the possibility of preventing leprosy by vaccination with BCG. But the epidemiological enquiry which he made in French Guiana between 1933 and 1935, and the fact that tuberculosis had been rapidly diminishing there for some years while leprosy had not been diminishing, convinced him that tuberculosis had not chased leprosy from Cayenne, but rather the other way round. [See this *Bulletin*, 1952, v. 49, 875.]

Only one page is devoted to sulphone treatment, but nine pages to chaulmoogra treatment. The chapter on prophylaxis is of particular interest, as the author's rich experience overseas is drawn upon. He considers that though isolation of patients is not without a favourable effect in the regression of leprosy, the decisive factor in the disappearance of the disease is the modification of unfavourable social conditions. He accounts for the familial distribution of leprosy by saying that when there is one leprosy patient in a family there is likely to be an important number of other members susceptible to the disease. In New Caledonia he noticed that when several members of one family were affected they all had lesions similar in nature and in the same places on the body.

He denies the report that leprosy was brought to New Caledonia by a Chinese ; the disease was there long before in a mild form, and it was the changed economic and social conditions that caused the serious epidemic outbreak.

[Whether one agrees with the author or not in many of his original statements, the book is most interestingly written from his own unique experiences, and will well repay careful study.] *Ernest Muir*

BROWN, R. **World Survey of Catholic Leprosy Work. A Case Study in Christian Technical Cooperation.** With a message to Catholic Leprosy Workers by T. ASPE. 92 pp. [1952.] Techny: The Mission Press, Illinois, U.S.A. [75*c*.]

This survey is made up largely from the replies to a questionary, and is described in the Foreword as "the first complete objective study of Catholic leprosy work ever prepared for the general public".

Leprosaria in general are divided into 5 categories :—

A. Catholic mission institutions, completely self-supporting, of which there are 15 ;

B. 82 Catholic missions getting government subsidies, with 20,040 in-patients ;

C. 122 government hospitals employing Catholic sisters, with 46,587 patients ;

D. Purely secular institutions visited by Catholic priests ;

E. Protestant mission leprosaria, "Hospitals of this Type are numerous, large, and well equipped in medical supplies. A number of them also have model research laboratories."

There are in the world "97 Catholic leprosy institutions with a total of 25,437 patients". Also in addition to this "Catholic Sisters serve as nurses in 122 government leprosaria, giving care to 46,587 patients".

A general survey is given of anti-leprosy work in general with mention of modern treatment, social welfare and Christian Occupational Therapy. A list is given of all organizations engaged in leprosy work, and statistics of institutions are listed under different countries.

The survey is truly "Catholic" in that it begins with a quotation from Mahatma Gandhi, and also as shown by the following quotation : "Catholic lay volunteers for leprosy work still have far to go before they can equal the splendid record of the forty English men and women (including some married couples) who have been serving in government and Protestant leprosaria in Africa since 1935 under BELRA, in cooperation with Toc H."

There is an eloquent and stirring message from Monsignor Thomás Aspe, who, after nine years of work in Bolivia, contracted leprosy and was named the Bishop of Calínico. *Ernest Muir*

PIZZI, M. **Prevalence of Leprosy in the World.** *Epidemiological & Vital Statistics Rep. W.H.O.* 1952, June, v. 5, No. 6, 263–82. [103 refs.] [In parallel French & English.]

It is not easy to make an accurate estimate of the number of leprosy cases in the world. In many countries no attempt at a survey has been made and the only information available is of the few segregated cases. Where surveys have been made in large endemic areas such as India and Africa, it has often been possible only to make rapid examinations of small sample areas. Two world estimates are mentioned, the one 2 million and the other 7 million.

In compiling vital statistics the author has been hampered by the omission from official documents or technical papers of important data, such as age or sex distribution and the type of the disease. "For the countries for which we have been able to find these data, attention should be drawn to the fact

that while in Africa the proportion of lepromatous cases is about 20 per cent. (except for the Union of South Africa), in America that proportion varies between 40 per cent. (Paraguay) and 90 per cent. (Colombia), in most places being above 50 per cent. If the criteria for classification were the same in both continents and assuming that the samples were taken at random from among the total number of cases, this difference would indicate *prima facie* that the infection is older in Africa since apparently the lower proportion of infectious cases would imply a higher immunity." [It is impossible from its nature to abstract the data collected in this very valuable Report, which should be on the reference shelves of all who are interested in the study of leprosy.] *Ernest Muir*

Innes, J. R. **A Leprosy Survey in Zanzibar and Pemba.** *Leprosy Review.* 1952, Apr., v. 23, No. 2, 67–72, 2 folding plans.

The population of these two islands is respectively 150,000 and 114,000. In the former 10,748 males were examined, females being left out because of local sentiment ; in the latter 21,903 of both sexes were examined. In Zanzibar 47 cases were found, which after allowing for the lesser frequency of leprosy among females, worked out at 3·9 per thousand. In Pemba 122 cases were found, making 5·5 per thousand, of which 45 cases were in females. Of the whole, 21·8 per cent. were of 14 years and under. Eighteen per cent. were from the mainland. There was the lepromatous type in 18 per cent. " There was a great predominance of elevated tuberculoid lesions of leprosy, these cases numbering 103, or 60 per cent." The recommendations for control are : adequate amount of sulphone drugs ; enlargement of the two existing leprosaria to hold 150 patients ; a lay worker to be supplied by BELRA for each island, and suitable houses and motor vehicles for the same ; spread of information through District Commissioners and *Mudirs*. The resistance of the Tumbatu people to the survey may be gradually broken down when they see the benefit to the few who are willing to come. Later, it might be possible when local public opinion has been educated to take measures to prevent the entry of patients from outside. The paper is illustrated with 2 maps. *Ernest Muir*

Maxwell, J. L. & Kao, L. **The Classification of Leprosy in Eastern China.** *Internat. J. Leprosy.* New Orleans. 1952, Jan.–Mar., v. 20, No. 1, 39–45.

This article was unfinished at the time of Dr. Maxwell's death and was prepared for submission by Mrs. Maxwell and two of his colleagues. It deals with pecularities in leprosy as found in 250 cases examined in Eastern China, and confirms the differences described by Ryrie in the Chinese in Malaya [this *Bulletin*, 1948, v. 45, 609]. Since the war an area where leprosy was formerly uncommon now shows a much increased incidence, apparently as the result of the hardships suffered in the war. The authors found it impossible in examining these cases to adhere to the classification of the Havana Congress, since it seems to include all neural cases under the heading tuberculoid. In their experience with Chinese patients " *all* cases of lepromatous leprosy show alterations of sensation from the first " and in a very large majority of them there is a neural stage with very definite polyneuritic symptoms long preceding any lepromatous manifestations. *Ernest Muir*

Wade, H. W. & Ledowsky, V. **The Leprosy Epidemic at Nauru ; a Review with Data on the Status since 1937.** *Internat. J. Leprosy.* New Orleans. 1952, Jan.–Mar., v. 20, No. 1, 1–29, 1 fig. [14 refs.]

Nauru is a coral atoll some 12 miles in circumference, in the South Pacific. Large deposits of guano have made it important as a source of phosphate. The

population consists of about 1,500 Nauruans and some 400 Gilbert Islanders who work for the Phosphate Commission. Leprosy was introduced by a Gilbertese woman about 1911, and spread slowly at first, but after the 1920 influenza epidemic the numbers increased rapidly till in 1929 about 35·0 per cent. of the then population of over 1,300 was affected. Isolation of open cases, out-patient treatment of closed cases, and periodic surveys of the population were followed by reduction in 1941 to 41 cases in segregation and 92 enrolled in the clinic. When the Japanese occupied the island in 1942, some 39 of the open cases were forced into a barge and taken out to sea never to be heard of again.

In 1950, after the segregation station had been rebuilt and surveys made, there were 12 cases in the station and 56 under treatment at the clinic. In 1951 when Dr. Austin examined the patients and made a rapid survey, he found no new cases ; of the 56 patients attending the clinic only 4 had active lesions ; of the 11 patients at the leprosy station all were bacteriologically positive, 3 having tuberculoid disease, and the rest lepromatous. " The Nauru epidemic is unique in the history of leprosy in the extent to which the native population was affected within a relatively short time . . . , in the great predominance of the maculoanesthetic form of the disease, in the nature of the control measures employed, and in the apparently good results of treatment." Great susceptibility is shown in the rate of development of the epidemic once it was started, and yet 90 per cent. of the cases were classified as maculoanaesthetic. " Innate resistance is also indicated by the highly beneficial effects of the treatment given, based almost entirely on chaulmoogra oil and its derivatives." The authors consider that besides early diagnosis and active treatment " the facts in the case suggest that some other inherent and fundamental factor was operative, and are in keeping with Lurie's view with respect to tuberculosis that resistance to attack is distinct from resistance to the progress of an already engrafted disease ". [For earlier reports, see this *Bulletin*, 1930, v. 27, 997 ; 1935, v. 32, 330.] *Ernest Muir*

Lampe, P. H. J. Disminución, baja incidencia y desaparición de la lepra en el Archipiélago del Caribe y América Central. (Informe preliminar.) [**Decline, Low Incidence and Disappearance of Leprosy in the Caribbean Archipelago and Central America**] *Bol. Oficina Sanitaria Panamericana.* 1952, May, v. 32, No. 5, 412–15. [14 refs.] English summary (6 lines).

The literature and statistics available show a tendency to diminution and disappearance of leprosy in Central America and the Caribbean Area, and it is urged that a special study be made of the factors underlying this diminution, with the use of uniform methods of procedure similar to those used in Texas and Bolivia. The urgency of not losing this opportunity is stressed.

Ernest Muir

Salazar y Cruz, S. Breve historia de la lepra en Santiago de Cuba. [**Short History of Leprosy in Santiago de Cuba**] *Rev. Sifilografía, Leprología y Derma, tología.* Marianao, Cuba. 1951, Sept., Oct., Nov. & Dec., v. 7, No. 3, 148–61-1 chart.

González Prendes, M. A. La lepra en Oriente. (Datos historicos.) [**Leprosy in Oriente Province, Cuba, from the Historical Aspect**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1951, Sept., Oct., Nov. & Dec., v. 7, No. 3, 119–35. [65 refs.]

González Prendes, M. A. Distribución geográfica de la lepra en Oriente. [**Geographical Distribution of Leprosy in Oriente Province, Cuba**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1951, Sept., Oct., Nov. & Dec., v. 7, No. 3, 136–42. [12 refs.]

Ybarra Pérez, R. & González Prendes, M. A. Estado actual de los enfermos de lepra en la provincia de Oriente. [**Cases of Leprosy in the Oriente Province of Cuba**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1951, Sept., Oct., Nov. & Dec., v. 7, No. 3, 143–7.

The latest figures show that in the Oriente Province of Cuba there are 1,400 cases of leprosy, of which 1,047 are ambulatory and 353 are hospitalized. In this paper a study is made of the ambulatory patients alone. Those between the ages of 16 and 50 form 67·61 per cent. The proportion of white persons in the total healthy population is 61·6 per cent., and the proportion of white patients with leprosy is 42·21 of the whole number of patients. Males form 50·18 per cent. The lepromatous cases comprise 39·44 per cent. of the whole. In the dispensaries 56 per cent. of the 1,047 patients are under treatment. The authors are filled with hope by the numbers attending regularly for treatment. *Ernest Muir*

Dubois, A. Quelques inoculations volontaires ou accidentelles de la lèpre aux êtres humains. [**Some Voluntary or Accidental Inoculations of Leprosy in Human Beings**] *Inst. Roy. Colonial Belge Bull. des Séances.* 1952, v. 23, No. 1, 199–213.

Danielsen in 1848 inoculated himself and his assistants on repeated occasions, without producing leprosy ; but as the existence of the bacillus was not known at that time the inoculum may have been at fault. Between 1884 and 1888 Mauritz in Molokai scarified with leprosy material unsuccessfully 10 male and 5 female '*kokuas*' who offered themselves voluntarily for this experiment. None of these developed the disease within 10 or 15 years although they sought to acquire it and also mixed freely with bad, ulcerating cases.

Arning between 1883 and 1886 scarified the skin of Keanu, a condemned prisoner, and rubbed in leprous material ; he also transplanted a leprous nodule into the forearm of the same man. He developed leprosy, but the experiment was rendered doubtful by the fact that he lived in an endemic area and members of his family were said to have suffered from leprosy. Marchoux tells of a surgeon who inoculated himself accidentally while operating on a case of leprosy and later developed leprosy, the first lesion being at the point of inoculation.

Lagoudaky in Egypt inoculated himself repeatedly and developed leprosy, but he was accustomed to treat patients at a leprosy clinic and might have acquired the disease otherwise.

Lastly the two Americans are mentioned who developed leprosy on tattoo sites [this *Bulletin*, 1948, v. 45, 441].

The author mentions 12 cases that have come under his own observation in the last 10 years among Europeans who had worked in endemic countries. One had frequent contacts with leprous patients professionally, 2 had occasional such contacts, the 9 others had no connexion with medicine or with leprosy and were not people who were likely to come into sexual contact with the disease. The author has come to consider that while the majority of people have strong resistance to leprosy, there a few people who are very receptive to the infection. *Ernest Muir*

HAEDICKE, T. A., REAGAN, R. L., SCHENCK, Dorothy M. & BRUECKNER, A. L. **A Demonstration of *Mycobacterium leprae* by Electron Microscopy.** *Internat. J. Leprosy.* New Orleans. 1952, Jan.–Mar., v. 20, No. 1, 47–52, 5 figs. on 2 pls.

Magnifications up to 20,000 were obtained by means of the R.C.A. EMU electron microscope. Material was obtained from a Filipino patient suffering from the lepromatous type of leprosy. The material was taken by a method described ; the skin removed after swabbing with alcohol, and was ground, centrifuged, and part of the sediment was left on parlodion screens overnight to dry. The forms observed were " for the most part extraordinary with respect to their length, they often appearing more as streptothrix-like threads than bacilli of normal proportions. They are interesting, also, in the contrast presented by different individuals with respect to their density ; some appear solid and plump, while others . . . as more or less empty membranes." [The method of preparation as described is not very reassuring, as it leaves a doubt in the mind of the reader whether there might not have been contamination. It is a pity for instance that part of the material was not stained and examined by the ordinary Ziehl-Neelsen method to make sure that all the rods present were acid-fast.] The appearance is shown in three electron micrographs. [See also this *Bulletin*, 1949, v. 46, 476.] *Ernest Muir*

FIGUEREDO, N. & DESAI, S. D. **A New Method for the Detection of Leprosy Bacilli in Neural Cases and Contacts.** *Indian J. Med. Sci.* 1952, May, v. 6, No. 5, 296–301.

A method is described by which bacilli are found in neural cases of leprosy when they cannot be found by the usual methods, and in cases where a few bacilli can be found by the ordinary methods more bacilli are counted by this new method. Biopsy material is obtained by making two parallel incisions in the skin 3 mm. apart which meet in the corium, and removing the wedged-shaped piece of skin. This is placed in a centrifuge tube containing 2·5 cc. of chloroform with 2·5 per cent. acetone and allowed to soak for 4 to 5 hours. " With a glass rod, the tissue is pressed against the sides of the tube with a rotary motion under the surface of the chloroform till the piece is flattened. The tissue is then rejected. The chloroform in the tube is evaporated over a water bath till a few drops remain. When cool, about 5 cc. of sulphuric ether are added and centrifugalised at 3,000 r.p.m. for 15 minutes. The ether is then decanted, leaving a few drops at the bottom of the tube. These drops are stirred with a platinum loop and poured, drop by drop, from the tube on a slide warmed previously over the flame of a spirit lamp, and a smear is made. A few drops of ether are added to the tube to wash out the residue and these drops are added, drop by drop, to the smear." The smear is fixed by warming over a spirit lamp, or with the aid of Carnoy's fluid in which it is placed, face down, for 10 minutes. After the smear has been dried by gentle warming, carbol-fuchsin is added cold for 15 minutes or if Carnoy's fluid is used the slide is heated till vapour arises, and then, when the vapour has gone, again heated and left for 5 minutes before washing and decolorizing, which is done with 10 per cent. hydrochloric acid in distilled water. Counterstaining is with 1 per cent. methylene blue in distilled water. The results in 46 neural cases by this method and by ordinary methods are shown, with a remarkable increase in the number of bacilli found. In 8 doubtful cases which were bacteriologically negative by ordinary methods, except in two in which 2 bacilli were found in each, 5 up to 30 bacilli were counted by the method described. In 48 contacts without

visible lesions from 6 up to 60 bacilli were found in 31 of the contacts. [See also this *Bulletin*, 1949, v. 46, 1052.] *Ernest Muir*

KVITTINGEN, J., CUTLER, J. C., GUEVARA, J. A., MCCULLOUGH, J. C., ROSE, Evelyn, FORD, Virginia, TAMPI, R. B., SEN, S., LAKSHWIR, KHAN, J. & DASS, P. **Serological Tests for Syphilis in Lepers. Tendency for various Antigens to give False-Positive Reactions.** *Bull. World Health Organization.* Geneva. 1952, v. 5, No. 4, 481–504.

These authors carried out serum tests for syphilis on 821 cases of leprosy, employing 3 different reactions : the Meinicke (MKIR), the VDRL (various antigens) and the Kahn. In the first group the Meinicke gave 3·2 per cent., the VDRL 4·4 per cent. and the Kahn 40·8 per cent. positive reactions ; in a second group the figures were Meinicke 19·0, VDRL 37·0 ; in a third group they were Meinicke 21·6, VDRL 36·5, Kahn 27·0 ; in a fourth they were Meinicke 14·4, VDRL 16·9–40·2, Kahn 30·4 ; the results in further series were similar but two different VDRL antigens gave discrepant results, and when sera were retested in a follow-up survey, results showed considerable variation. In general, the Meinicke reaction gave fewer positive results in leprous sera than either the VDRL or Kahn [but the antigen employed may have been a relatively insensitive one, see GHORPADE, *Bulletin of Hygiene*, 1952, v. 27, 1021]. In some cases it is possible that positive reactions were due to a concomitant syphilis but it is probable that most of the positive reactions with the VDRL and Kahn were " biologically false " ; evidently both crude and cardiolipin antigens were at fault. The fact that previously negative reactions were found to be positive in a follow-up survey suggests that the disease was aggravated during a " lepra reaction ". Detailed results are given in 10 tables. *T. E. Osmond*

KVITTINGEN, J. **Behaviour and Stability of Serum Reagins in False-Positive Serological Tests in Leprosy.** *Bull. World Health Organization.* Geneva. 1952, v. 5, No. 4, 505–11.

Sera from non-syphilitic leprosy patients tended to give strongly positive reactions with the VDRL and Kahn tests and negative ones with the Meinicke test. The positive reactions usually showed floccules very coarse and compact but the titres were surprisingly low ; when these sera were kept at room temperature the strength of the reaction tended to weaken and when the sera were heated for 5 minutes at 65°C. the reactions reverted to negative ; this did not happen in the case of syphilitic sera. The Meinicke reaction differs from the other two in two respects : (1) the sera are tested unheated, (2) the antigen contains balsam of tolu instead of cholesterol ; it is suggested that increase in the blood cholesterol and changes in the calcium content of the blood in leprosy may account for the false positive reactions when an antigen containing cholesterol is used ; further research is necessary.

T. E. Osmond

PÄTIÄLÄ, R. & RAEKALLIO, T. Über die elektrophoretisch bestimmte Proteinkomposition und Lipoidgehalt des Serums sowie die Fibrinogenmenge des Plasmas bei Lepra. [**The Electrophoretic Estimation of Protein and Lipoid in the Serum and of Plasma Fibrinogen in Leprosy**] *Ann. Med. Exper. et Biol. Fenniae.* Helsinki. 1951, v. 29, No. 3, 335–43. [15 refs.]

ROY, A. T. **Suspension of Diaminodiphenylsulphone in Leprosy.** *Leprosy Review.* 1952, Apr., v. 23, No. 2, 73–79.

This is a record of 140 lepromatous cases under treatment with an oily suspension of DDS for one year. The suspension was 20 per cent. in one of three oils, arachis, hydnocarpus, and purified coconut oil. The first was found to be too thick ; hydnocarpus oil was only two-thirds the price of coconut oil and so it was preferred. Injections were given subcutaneously in total doses of 0·4 gm., 1 cc. of the suspension being given twice a week. Improvement was obtained in 74·1 per cent. after one year. There was not much trouble with " depôts " if the point of injection was immediately massaged well. There was lepra reaction in 63·5 per cent. of patients, but this was not serious except in 5, 3 of whom improved slightly and 2 became worse. Detailed results are shown in a table. *Ernest Muir*

FLOCH, H. Sur les sulfones-retard en thérapeutique antilépreuse et leur utilisation en Afrique Noire. [**The Slowly-Acting Sulphones in Anti-Leprosy Therapy, and their Use in French African Colonies**] *Bull. Acad. Nat. Méd.* 1952, v. 136, Nos. 14/15, 221–5. [12 refs.]

This article reiterates the form of anti-leprosy treatment which Dr. Floch has previously advocated, namely DDS given either by subcutaneous injection in a suspension in an agar-saline solution ; or orally in a dose of 600 mgm. once a week or 400 mgm. twice a week. When injected the dose is 1·20 gm. once a week. This is the maximum dosage aimed at, and should be worked up to gradually, the amount being diminished for children and those not able to tolerate the full amount. The author makes up the DDS tablets with 0·010 gm. of belladonna and 0·400 gm. of carbonate of calcium to 0·200 gm. of DDS. He quotes with approval the recent recommendation of the Medical Inspector General of French Colonial Troops that this form of treatment should be substituted there for chaulmoogra treatment [this *Bulletin*, 1952, v. 49, 411]. *Ernest Muir*

SCHUJMAN, S. **Results of One Year's Experience with TB-1 in the Treatment of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1952, Jan.–Mar., v. 20, No. 1, 31–8, 6 figs. on pl.

" In this report are described the results obtained in approximately one year of the use of TB-1 in a group of 14 patients, 2 tuberculoid and 12 lepromatous. Of this total, 11 had received no previous antileprosy treatment.

" Both of the tuberculoid cases have improved markedly. All of those of the lepromatous type have improved, markedly in 2 instances, moderately in 7, and slightly in 3, the clinical and bacteriological changes being taken into consideration in assessing the degree of improvement.

" It is pointed out that, with the exception of one slight lepromatous case with a lone patch which became clinically and bacteriologically negative, clinical and bacteriological clearing up has not yet been achieved.

" Attention is called to the good tolerance of TB-1, since in no case has it been necessary to suspend the treatment definitively. On the basis of these facts, the following conclusions are drawn :

" 1. The aldehyde derivatives of thiosemicarbazone (TB-1) possess an indubitable therapeutic activity against all forms of leprosy, an activity which is evidenced by alterations and then regressions observed clinically and bacteriologically.

"2. Because of the good tolerance of this drug in the great majority of cases, and its ease of administration, it deserves to be included in the therapeutic armament against leprosy."

Fernández Nafría, A. & Hens Tienda, L. Terapéutica actual de la lepra. [**Present Therapy of Leprosy**] *Med. Colonial.* Madrid. 1952, June 1, v. 19, No. 6, 545–74. [30 refs.]

A general review, in Spanish, with 29 references.

Brand, P. W. **The Orthopedic Care of Leprosy Patients.** *Leprosy Review.* 1952, Apr., v. 23, No. 2, 50–62, 5 figs.

Hanks, J. H. **The Infectiousness of Murine Leprosy Bacilli after Exposure to different Conditions** *in Vitro. Internat. J. Leprosy.* New Orleans. 1952, Jan.–Mar., v. 20, No. 1, 67–81. [15 refs.]

"1. A method permitting quantitative comparisons of the infectiousness of fresh murine leprosy bacilli and of treated aliquots has been described.

"2. Comparisons between fresh and acid- or alkali-treated bacilli, refrigerated bacilli, or incubated bacilli revealed that the infectious quality of the bacilli for moderately resistant tissues deteriorated markedly under each of the circumstances evaluated.

"3. Although the observations of earlier workers on the preservation of murine leprosy bacilli *in vitro* could not be confirmed by subcutaneous inoculation of moderately resistant rats, they were readily confirmed by the inoculation of more susceptible tissues such as the testes of rats and the subcutis of the more susceptible mice.

"4. An analysis of the results necessitates the conclusion that the property of infectiousness for resistant tissues is not dependent on viability alone, but on other more readily modified properties of the microorganisms. The implications of this conclusion have been discussed."

Tanimura, T. & Nishimura, S. **Studies on the Pathology of Murine Leprosy.** *Internat. J. Leprosy.* New Orleans. 1952, Jan.–Mar., v. 20, No. 1, 83–94, 32 figs. on 4 pls. [18 refs.]

A contrast is drawn between the lesions of murine leprosy in rats and human leprosy in man. The former does not affect the nervous system ; there are no lesions of macular form ; bacilli are found only in cells of the mesodermal system and not in mucous epithelial cells, endothelium of the larger vessels, gland epithelium or other parenchymatous cells ; bacilli are in larger numbers than in human leproma ; fatty granules are quite fine, and no vacuoles are found ; tissues round the lesions are not infiltrated with cells and are not reactional ; murine nodes are poor in connective tissue and soft, rarely undergoing necrosis ; in the murine disease there is no proliferative interstitial inflammation of the testis, liver or meninges ; it has no tendency to produce lesions in mucosa, testis and the adrenal ; the virulence of the Stéfansky bacillus for the rat family is much less than that of Hansen's bacillus for the human being. "The difference between the bacilli of murine and human leprosy is much greater than that between bovine and human tubercle bacilli. It remains as an interesting problem if this difference should be attributed to the factor of virulence of the bacilli, or to the specific resistance of the rats."

Ernest Muir

HELMINTHIASIS

COUTELEN, F., GERVOIS, M., COCHET, G., BIGUET, J. & MULLET, S. Le parasitisme intestinal chez les enfants d'âge scolaire. Étude médico-sociale. [**Intestinal Parasitism in Schoolchildren**] *Hyg. et Méd. Scolaires.* 1952, v. 5, No. 2, 69–76.

Between 1948 and 1951 the authors examined large numbers of children in Lille and other areas for the presence of intestinal parasites. The orthodox methods of diagnosis were used.

The first series consisted of 7,175 children in infant schools in Lille, for children of 2–6 years. The average percentage showing parasites during the 4 years was 57·7 (from 63·5 in 1948 to 53·2 in 1951). Altogether, 13·5 per cent. (from 20·5 to 11·7) showed 2 to 4 species of parasites. *Enterobius* was the commonest parasite found.

Among some 700 other children, up to 15 years and over in 5 other establishments, the percentage of parasites varied between 60·6 and 98 per cent. The older children harboured a relatively higher percentage of *Ascaris* and *Trichuris*.

Prevention is discussed, and the implications of this high degree of intestinal parasitism considered. *H. J. O'D. Burke-Gaffney*

DAWOOD, M. M. **Bilharziasis in Bilad El Nuba in Egypt.** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, Nos. 9/10, 660–69.

A snail survey at Bilad El Nuba in Southern Egypt between the Aswan dam and the Sudan revealed the presence of *Bulinus* in large numbers and various sizes at all the steamer landing places on the Nile from Shallal to Eneiba. The snails were collected near the shores at a depth of one metre, and were also found under granite rocks overgrown with algae which constitute apparently the only vegetation, and on wet sand when the water level is low. The author " found Bilharzia widely spread in this area " and states that the intensity of infection with *S. haematobium* was found to be the same as it is in lower Egypt.

The significance of this finding of *Bulinus* in the Nile itself, which is the only water supply for the population, is discussed. The author is convinced that the Nile is the source of infection and that control measures should consist of the provision of artesian wells and convenient latrines rather than copper sulphate application. This would reduce the infection rate in women and old people, who would prefer to use water near the village than visit the river. Small collections of water left by the fall in the river water should, however, be treated with copper sulphate.

Infected *Bulinus* from the Nile were observed to discharge thousands of cercariae in the laboratory for one month and a half. Other snails, such as *Physa* and *Melania tuberculata* were also collected, but less commonly than *Bulinus*.

Of 10 patients examined for *S. haematobium*, 6 were diagnosed as positive by finding eggs in the urine. The remaining 4, who had received treatment and were negative by this method, were diagnosed as positive by the rectal scrape method.

Trials with Miracil revealed no difference in response to the drug in this district from that observed in other parts of Egypt. *J. J. C. Buckley*

SULTAN, Z. M. **The Symptomatology of Egyptian Splenomegaly. Its Incidence and Prevalence.** *Medicine & Lab. Progress.* Cairo. 1952, Mar., v. 13, No. 3, 63–73.

Some personal experiences of schistosomal infection and splenomegaly in the North Delta area of Lower Egypt.

HASEEB, M. A. **"Nilodin" in Treatment of** *Schistosoma haematobium*. *Brit. Med. J.* 1952, June 21, 1331–2.

Seven Sudanese patients, aged 12 to 53 years, with urinary schistosomiasis were given Nilodin, 15 mgm./kgm. daily. The course was intended to last for 5 days, but in fact only one patient tolerated the drug fairly well : the others showed signs of toxicity, usually on the third day, and this usually involved cessation of treatment. The first patient received 3 courses at intervals, but still passed viable ova after 105 days.

Signs of toxicity were yellow discoloration of the skin and mucous membranes, vomiting, anorexia and wasting. Toxicity was not diminished by the use of bismuth mixtures. No patient was cured.

The author wisely points out that no conclusions regarding the therapeutic value of Nilodin can be drawn from so small a number of cases, but adds the opinion that intolerance to the drug among Sudanese is a deterrent to its use for mass treatment. *H. J. O'D. Burke-Gaffney*

WATSON, J. M. **Clinical Investigations on the Treatment of Urinary Bilharziasis. Part III. Vitamin A.** *J. Trop. Med. & Hyg.* 1952, June, v. 55, No. 6, 128–35. [25 refs.]

This is one of a series of papers, two of which have already been published [see this *Bulletin*, 1951, v. 48, 480, 1005].

Many workers have studied the effect of vitamin A deficiency on helminthic infestations ; there is a brief summary of the literature on the subject. The general conclusion is that animals on a diet deficient in vitamin A show a diminished resistance to infection and more parasites survive in them as a result of it, though the reason for the greater parasite survival has not been adequately explained. KRAKOWER, HOFFMAN and AXTMAYER [*ibid.*, 1942, v. 39, 562] found that in the livers of rats deficient in vitamin A the destruction of *Schistosoma mansoni* adult worms was slight, while in control rats on a normal diet most of the worms were destroyed. The diet of peasants and labourers in Iraq is deficient in vitamin A, and it seemed to the author that correction of this deficiency might enhance the defences of the body with a consequent reduction in the worm load. An opportunity presented itself for examination of this theory and is the subject of this paper.

Among the population of the village of Tel Mohammed, near Baghdad, the incidence of *S. haematobium* infestation is 83 per cent. The source of infection is a stagnant drain containing great numbers of *Bulinus truncatus*. A squad of labourers was brought into the village to eradicate this focus of infection. All the labourers were free from schistosomal infection at the start of the work. Their activities involved entry into the infected water, so they afforded a good medium for experimental study and observation. The squad was divided into two groups ; one of these was given 5,000 international units of vitamin A on 6 days each week over a period of 3 months ; the other served as a control. All the men worked together, and at the end of the trial the urines of all were examined for the presence of schistosomal infection, and its intensity was estimated by the number of eggs passed over a period. Those found infected were subsequently suitably treated.

On statistical analysis the results of the experiment showed that the addition of vitamin A supplement to the diet of Iraqi labourers under these conditions of exposure did not protect them to any appreciable degree from the development of *S. haematobium* infection.

The differences between the effects of infection of rats deficient in vitamin A and of normal rats experimentally infected, and those obtained in the present

experiment require explanation. One possibility is that the diet of the control group of the men studied was not grossly deficient in vitamin A. Another is that the mechanism of destruction of the worms in man differs from that in the rat. In man, the normal host, the worms leave the liver on reaching maturity and travel down the portal vein ; in the rat, on the other hand, for the most part they complete their life cycle in the liver and sometimes in the lungs, and but few migrate into the peripheral parts of the portal system. After consideration of the explanations offered by several workers of the mechanism of worm destruction in various helminth infections, the conclusion is reached that in man it differs from that in the rat. In man the worms leave the liver after maturation ; ova are not normally present in the liver in great numbers ; and the worms can move by their own activities from narrow vessels into much larger ones, thus breaking contact with the vessel walls and escaping the cellular and other reactions produced by this contact. In the rat it seems that it is the confinement of the worms in small vessels in the liver, with close contact with the vessel walls, which facilitates the destruction of the parasites by the tissue reaction of the host. As a corollary, it may be inferred that any drug treatment of man which drives the worms from the more peripheral parasitized vessels into the smaller intrahepatic branches of the portal vein in the liver, and keeps them there long enough, would lead to their destruction, provided that the patient is not deficient in vitamin A. The drug doing this need not itself be actively schistosomicidal. It has already been observed that after treatment with Miracil D of mice or jerbils experimentally infected with schistosomes, dead worms are found in the liver alone [this *Bulletin*, 1948, v. 45, 1018]. As the majority of sufferers from schistosomiasis in the Middle East suffer from some degree of vitamin A deficiency, specific treatment may be more effective where this deficiency is corrected by vitamin A supplementation.

A. R. D. Adams

PARÁ, M. **The Distribution of certain Diseases in Brazil as indicated by Data obtained through Viscerotomy. I. The Incidence of *Schistosoma mansoni* Lesions in Material collected from 1937 to 1946.** *Mem. Inst. Oswaldo Cruz.* 1949, Sept.–Dec., v. 47, Nos. 3/4, 521–34. [Portuguese version 443–519, 2 figs. (1 folding). 22 refs.]

A systematic examination of liver specimens obtained by viscerotomy was undertaken during the period 1937 to 1946 in Brazil to obtain information as to the incidence and distribution of *Schistosoma mansoni* infections. The infection was diagnosed in 5,953 specimens of 267,107 examined, or 2·23 per cent. Only those specimens showing eggs of *S. mansoni* or a typical granuloma were diagnosed as positive.

Viscerotomy posts are operated in 1,174 of the 1,669 municipalities in Brazil so that the present survey covers most of the inhabited area of the country. The distribution and incidence of infection is well illustrated by a map and presented in copious detail in a number of tables. The eastern zone of the north-east region and the northern part of the eastern region have a relatively high endemicity with incidences of 5·16 and 7·49 per cent. respectively. The zones of highest endemicity are the States of Pernambuco 9·44, Alagoas 11·46 and Sergipe 10·25 per cent.

A comparison is made between the findings by viscerotomy and those of surveys carried out formerly in Brazil by faecal examinations and it is concluded that the latter method reveals a higher incidence. However, the liver viscerotomy is a valuable auxiliary process.

The data for the year 1938 are analysed to show age-group incidence. "It can be said that, as a rule, the incidence of schistosomiasis found among liver specimens examined is very low for the first years of life and increases notably during the later part of infancy reaching its maximum among the juveniles and young adults. A decrease is noted among the adults but is only accentuated in the 6th decade, that is among old people." *J. J. C. Buckley*

DE ALMEIDA, L. V. Dados preliminares de inquérito sôbre Esquistosomiasis mansoni e outras parasitoses em Pedra Azul, Minas Gerais. [**Preliminary Results of a Survey of *S. mansoni* and other Parasitic Infections in Pedra Azul, Minas Gerais**] *Rev. Assoc. Méd. Minas Gerais.* 1951, Sept., v. 2, No. 2, 257–60, 1 chart. English summary (6 lines).

MARQUES, R. J. À propos du diagnostic de la bilharziose pulmonaire. [**Diagnosis of Pulmonary Schistosomiasis**] *Ann. Parasit. Humaine et Comparée.* 1952, v. 27, No. 4, 387–93. [12 refs.]

The author, from Recife, Pernambuco, refers to the difficulty of detecting pulmonary schistosomiasis during life—indeed he is only able to quote one personal example of having found ova in the sputum despite many years of investigation. He recommends for this purpose the treatment of sputum with six times its volume of NaOH, 2 per cent. : the mixture is heated until it is homogenized, and, mixed with a little water, is centrifuged at 1,500 r.p.m. for 5–10 minutes.

On the other hand, the condition was recognized in pathological tissues in 20 of 192 cases and the author believes that this figure would have been higher had the tissue been digested with KOH.

In clinical diagnosis the chief points are to (1) eliminate other conditions, (2) employ all specific diagnostic aids for detecting schistosomiasis, (3) confirm that the pulmonary lesions are related to the presence of schistosomes. Radiological examination is not specific, but is an additional guide : the therapeutic test is extremely valuable, but is not always successful. Examples are given of the use of antimony treatment in the diagnosis of such cases.

Pulmonary schistosomiasis may be present concurrently with other diseases, such as tuberculosis. The possible relationship is discussed.

The author discusses the circulatory changes in pulmonary schistosomiasis, with brief reference to the literature and an illustrative case. Cardiac complications may be commoner than is generally believed.

H. J. O'D. Burke-Gaffney

ROSS, G. L., NORCROSS, J. W. & HORRAX, G. **Spinal-Cord Involvement by Schistosomiasis mansoni.** *New England J. of Med.* 1952, May 22, v. 246, No. 21, 823–6, 3 figs. [10 refs.]

"A case is presented of *Schistosoma mansoni* with an ectopic spinal-cord lesion as the presenting symptom complex. The diagnosis was made by biopsy of this lesion. Evidence of gastrointestinal involvement was found by biopsy of the rectal mucosa."

KUNTZ, R. E. & WELLS, W. H. **Laboratory and Field Evaluations of Two Dinitro-Phenols as Molluscacides for Control of Schistosome Vectors in Egypt with Emphasis on Importance of Temperature.** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 784–824, 4 figs. [15 refs.]

"The present study substantiates and adds to the earlier laboratory evaluation of DCHP [dinitro-o-cyclohexylphenol] and K604 [its dicyclohexylamine

salt] which has shown these compounds to possess certain attributes classing them as promising molluscacides. In this as well as in the above study [this *Bulletin*, 1951, v. 48, 273] DCHP is definitely considered the superior of the two compounds since it fills in greater part the requisites of a suitable molluscacide :—

" (1) DCHP is lethal to the majority of *Biomphalaria* and *Bulinus* in reasonably low concentrations, i.e. 3 to 5 ppm.

" (2) DCHP is not adversely affected in water with aquatic plants and unusual quantities of organic materials.

" (3) DCHP is sufficiently residual to kill a high percentage of snails exposed to treated water for 24 hrs. two to four weeks after application and its ovicidal properties surpass those of $CuSO_4$ at much higher concentrations.

" (4) DCHP although moderately toxic to mammals in concentrated mixtures has shown no ill effects to livestock (sheep, goats, water buffalos, donkeys, etc.) drinking water from canals treated with quantities of the chemical sufficient to kill all molluscs.

" (5) DCHP although toxic to fishes has not shown any appreciable deleterious effects upon aquatic flora in canals treated at 3 to 10 ppm., or to crops watered from these canals. There have not been sufficient toxic effects upon invertebrate populations, other than molluscs, to cause a drastic biological imbalance as evidenced by the return of fish and the feeding of shore birds in test plots a few days following the disappearance of yellow coloring due to the presence of DCHP.

" (6) Although DCHP at present is not obtainable at a figure that would encourage extensive field use, its cost-efficiency ratio is quite favorable. It has been intimated that the present price probably would be reduced considerably if manufacturers could sell DCHP in large lots. As indicated the cost-efficiency falls well within the range of practicability, even at the current price of 70 cents a pound, when the molluscacidal merits of DCHP are compared with those of $CuSO_4$ which now sells for 9 to 12 cents a pound. It must be repeated again, however, that the consideration of DCHP as a practical molluscacide is based upon the assumption that this compound would be employed in relatively still waters or be applied in those unusual situations where $CuSO_4$ is none too successful because of dense growths of vegetation in water with large quantities of organic materials and debris.

" (7) Rather extensive testing in the field as well as in the laboratory with the dinitro-phenol and other compounds has demonstrated the importance of temperature in molluscacidal work and in snail control. Other factors being equal, molluscacidal activity is sufficiently increased during the seasons with elevated temperatures as to warrant a consideration of this finding in planning a snail control program."

KOENIGSTEIN, R. P. Über das Vorkommen von *Schistosoma japonicum*-Eiern in chirurgischen Biopsien. [**Presence of** *Schistosoma japonicum* **Eggs in Biopsy Material**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 546–9, 1 fig.

The English summary appended to the paper is as follows :—

" Tissue sections of biopsy material were searched for eggs of Schistosoma japonicum at the C.M.S. Kwang-Chi Hospital, Hangchow, China. Eggs were found in excised appendices (14 cases), in rectum carcinomas (4 cases), mesentery, mesenterical glands, liver, sigmoid polyps, rectal fistula tissue, making up a total of 23 cases the majority of which did not show eggs in fecal deposits. Examination of biopsy material often helps to establish an early diagnosis of

schistosomiasis. Eggs can also be detected by macerating tissues in 10 per cent sodium hydroxyde solution (' digestion method ' of Gelfand and Ross)."

PESIGAN, T. P. **Studies on Schistosomiasis : Second Progress Report on Mass Surveys and other Accomplishments as of December 31, 1951.** *J. Philippine Med. Ass.* 1952, Apr., v. 28, No. 4, 177–89, 1 folding coloured pl.

This report brings up to December 1951 data on the progress of investigations and activities regarding schistosomiasis in the Philippines undertaken by the Department of Health. The first report has already been summarized [this *Bulletin*, 1951, v. 48, 274] and the present one covers the whole period from May 1949, in three stages. The 6 field units were increased to 8 (and afterwards reduced to 7) and greatly extended their operations. The results of the activities are shown in great detail in a spot map and 3 lengthy tables, setting out a summary of results for the 3 periods, the incidence of schistosomiasis and numbers treated in each part of the endemic areas, and the incidence of intestinal parasites in rural communities.

From this mass of information, the following points of special interest emerge :—

Endemic areas of schistosomiasis were established in 61 towns of 12 Provinces and the disease was shown to be absent in 70 others. Of 123,291 persons examined, *S. japonicum* infection was found in 12·2 per cent. Treatment with Fouadin was given to 5,318 and with Nilodin to 272.

In all towns surveyed but one, *Oncomelania quadrasi* snails were found in many streams and swamps. The distribution was very uneven, varying in density from " a few to several hundreds " per square metre. These 816 points were correlated with the maps of the towns. Altogether, over 1,100 km. of streams were surveyed and 248 km. were positive for *O. quadrasi*. Treatment of 102,000 sq. m. was effected, either with the Dinitro compound previously used, or more frequently with sodium pentachlorophenate. In 19,000 sq. m. treatment was by means of the flame gun. Snail densities were lowered by these treatments, but repeated treatments were necessary to keep down the snails.

Intestinal parasites continued to be common, even in areas where schistosomiasis was not found : the general incidence was 97·82 per cent. of which *Ascaris* accounted for 85·7 per cent., *Trichuris* for 52·7 and hookworm for 38·7 per cent.

Technical assistance is forthcoming from WHO and as a result of the data which have accumulated the author is optimistic about the preparation of a " well-balanced national schistosomiasis control program ".

H. J. O'D. Burke-Gaffney

STIJNS, J. Sur les rongeurs, hôtes naturels de *Schistosoma rodhaini* Brumpt. [**Rodent Hosts of** *Schistosoma rodhaini*] *Ann. Parasit. Humaine et Comparée.* 1952, v. 27, No. 4, 385–6.

The author, in Elisabethville, Belgian Congo, set out to discover the natural hosts of *S. rodhaini*, by means of examining stools and intestinal scrapings of wild rodents captured in the neighbourhood.

The rodents thus identified were *Lophuromys aquilus*, *Praomys jacksoni*, *Pelomys frater* and *Mastomys coucha*. These rodents frequent the banks of rivulets and streams, except *Mastomys* which is ubiquitous. Brief notes are given of the habits of each species.

Five specimens of *Tatera nyassae* were negative, as were 9 of *Crocidura luna*. Eggs of *S. rodhaini* were not found in mucus from batrachians, birds or reptiles

captured in the neighbourhood, nor in the stools of 20 African labourers engaged in cleaning canals infected with planorbids harbouring cercariae of *S. rodhaini*: on the other hand, all these men were heavily infected with *S. mansoni*.

It seems likely that *S. rodhaini* is only parasitic on rodents in nature. In these naturally infected animals eggs were infrequent in the stools and adults few in the mesentery and liver, in contrast to the massive infections produced experimentally in white mice. *H. J. O'D. Burke-Gaffney*

KOMIYA, Y. & MURASE, K. **Efficacy of Digestion Method for Collecting Metacercariae from the Fish Body.** *Japanese Med. J.* 1951, Feb., v. 4, No. 1, 43–8.

A digestion method is described for recovering metacercariae from the tissues of infected fish, and its efficacy is evaluated. The portion of tissue is minced and then incubated at 37°C. in artificial gastric juice for 1 to 4 hours. It is transferred to a large watch glass and 0·7 per cent. saline is added. The supernatant fluid is removed after a few minutes, replaced again and this procedure is repeated several times. The metacercariae are collected from the residual fluid by means of a small pipette.

In removing the supernatant fluid some of the metacercariae are also taken away. An experiment to determine the extent of this loss showed that in the fish *Pseudasbora*, the average loss of several different kinds of metacercariae was 40 per cent. In the fish *Sarcocheilichthys*, the average loss was 19 per cent. Of the different kinds of metacercariae, those of *Clonorchis sinensis* showed the lowest loss and those of *Cyathocotyle orientalis* the highest loss.

J. J. C. Buckley

ČMELIK, S. Ein antigenes Polysaccharid aus den Echinococcuscysten. [**An Antigenic Polysaccharide in *Echinococcus* Cysts**] *Biochem. Ztschr.* 1952, May 27, v. 322, No. 6, 456–62. [27 refs.]

ČMELIK, S. Zur Kenntnis der Lipoide aus den Cystenmembranen von *Taenia echinococcus*. [**Observations on the Lipoids from the Cyst Membranes of *Echinococcus granulosus***] *Hoppe-Seyler's Ztschr. physiol. Chem.* 1952, Apr., v. 289, Nos. 2/3, 78–9.

CALVÓ FONSECA, R. Una nueva endemia parasitaria en Cuba "La Inermicapsiferiasis". [**A New Parasitic Endemic in Cuba "Inermicapsiferiasis"**] *Rev. Kuba Med. Trop. y Parasit.* 1951, July–Aug. & Sept.–Oct., v. 7, Nos. 7/8 & 9/10, 92–6; 108–19, 8 figs. [33 refs.]

GÜREVIN, I. Otokton bir *Ancylostoma duodenale* infestasyonu vak'asi. [**First Case of *Ancylostoma duodenale* Infestation in Turkey**] *Tip Fakültesi Mecmuasi* (*Bull. Facul. Méd. Istanbul*). 1952, v. 15, No. 1, 155–65, 7 figs. [18 refs.]

The English summary appended to the paper is as follows :—

"We have examined the stool of a female patient who had been sent to our clinic presenting symptoms of severe hypochromic anemia and have found large numbers of ancylostoma eggs. We have prescribed pure benzine and tetrachlorethylene. The study of the parasites proved them all to be ancylostoma duodenale. In 1925 Akil Muhtar and Sedat Tavat reported for the first time the existence of hookworm infestation in the eastern part of the Black Sea in Turkey. Necator americanus exclusively was always found and no case of ancylostoma duodenale infestation was reported until 1951 when we identified

for the first time the latter worm in the stool of a Turkish woman." [See also this *Bulletin*, 1925, v. 22, 892.]

CHAND, D. **Hookworm Disease in Sirmur District (Himachal Pradesh). A Report of 100 Cases.** *Indian Med. Gaz.* 1952, Apr., v. 87, No. 4, 142–5.

HUECK, O. Hakenwurmerkrankung in der Krankenhauspraxis in Tungkun, Südchina. [**Ankylostomiasis in Hospital Practice in Tungkun, South China**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 537–45. [11 refs.]

COUTINHO, J. O., CAMPOS, R. & AMATO NETO, V. Nota sôbre a prevalência da estrongiloidíase em crianças de São Paulo. **Observations on the Prevalence of Strongyloidiasis in Children in São Paulo, Brazil**] *Folia Clin. et Biol.* S. Paulo. 1951, Dec., v. 17, No. 2, 191–207, 3 graphs.

The authors describe in detail an investigation of the stools of 1,068 school and pre-schoolchildren in São Paulo, Brazil, directed primarily to the estimation of the prevalence of *Strongyloides stercoralis*. Comparisons were made between BAERMANN's method, water-sedimentation (HOFFMAN, PONS and JANER) and FAUST's zinc-sulphate flotation method. The results are presented and analysed in terms of actual and percentage findings by the three methods and combinations of them, in age and sex groups, in relation to other intestinal parasites, and as regards the extent of infection by one or more of them. The findings are compared with those of other workers.

In all, larvae of *Strongyloides* were found in 129 (12·07 per cent.) of the children. Baermann's method was the most effective, accounting for 11·42 per cent. positive results, compared with 7·58 per cent. for the sedimentation and 5·05 per cent. for the flotation techniques.

Other helminths found included *Trichuris* (51·68 per cent.), *Ascaris* (35·39), hookworms (8·98), *Enterobius* and *Hymenolepis* (over 3 per cent. each), and others. Only 2 schistosomes were found. In 337 cases in which more than one parasite was found, there were 2 in 71·21 per cent., and 3 in 23·14 per cent. The authors point to the importance of accurate diagnosis of *Strongyloides* infection. *H. J. O'D. Burke-Gaffney*

BACKHOUSE, T. C. & BEARUP, A. J. **Ascariasis in Sydney Children and its Relation to the Urban Backyard.** *Med. J. Australia.* 1951, Nov. 3, v. 2, No. 18, 595–6.

" 1. The life cycle, means of transmission and chief pathological effects of *Ascaris lumbricoides* are outlined.

" 2. Results are given of a short investigation into the occurrence of *Ascaris* infestation in an overcrowded part of Sydney.

" 3. Human *Ascaris* eggs were demonstrated in the soil of 10 out of 11 backyards of houses where children harbouring *Ascaris lumbricoides* were living. Pollution of the ground by young children is thought to be the chief source of new infections in the area.

" 4. Measures for checking the spread of infection are suggested."

MOYLE, V. & BALDWIN, E. **Volatile Fatty Acids of *Ascaris lumbricoides* from the Pig.** *Biochem. J.* 1952, July, v. 51, No. 4, 504–10, 2 figs. [17 refs.]

Diethelm, L., Heuck, F. & Kloos, K. Die Ascaridiasis und ihre Bedeutung für schwere hämorrhagische Darmveränderungen. [**Ascariasis and its Significance in Severe Haemorrhagic Enteritis**] *Klin. Woch.* 1952, June 1, v. 30, Nos. 21/22, 510–11, 1 fig. [13 refs.]

In this brief paper the authors report that they found that X-ray examination revealed ascariasis in a high proportion of patients with necrotic enteritis. They quote literature on the toxicity of substances excreted by *Ascaris* and on *Ascaris* antigens, and describe briefly the effects of injections of whole-*Ascaris* extracts into rabbits and guineapigs previously sensitized to *Ascaris*. These injections caused severe enteritis with, in some of the experimental animals, haemorrhage and necrosis. Injections of the same material into control animals not sensitized produced only slight effects. [The technique and results of these experiments are not very clearly explained.] The authors conclude that human infection with *Ascaris* can cause severe allergic changes in the intestine and that the different reactions and degrees of symptoms caused can be explained on an immunological basis. An analogy with eosinophilic infiltration of the lung and treatment with antihistaminic substances is suggested. This allergic reaction of the intestine caused by *Ascaris* is placed by the authors in the same category as the anaphylactic reactions caused by salvarsan, milk, casein, fish- and crab-albumin and other substances.

G. Lapage

DeSa, A. E. **Ascariasis—a Surgical Problem.** *Indian Physician.* 1952, May, v. 11, No. 5, 93–102, 5 figs.

Of 8,303 admissions to the Jerbai Waia Hospital for Children, Bombay, during 1948–50, 61 were for ascariasis, in 35 of which surgical complications were present. The author divides the 49 cases in the present series into 4 groups :—

1. Cases with intestinal obstruction and palpable lump ...	15
2. Cases with intestinal obstruction and without a palpable lump	18
3. Cases of perforative peritonitis associated with 1 and 2 ...	14
4. Cases of ascarideal peritonitis without obvious perforation...	2

In the cases associated with obstruction and mobile lump the latter is commonly found near the umbilicus, owing to the fact that it is in the small intestine. Pyrexia and a varying degree of toxaemia, characterized by apathy, low delirium and muscular twitchings are found in all cases. The obstruction is usually in the lower reaches of the ileum and may be associated with perforation in or above the obstructing mass of worms. Peritoneal reaction is slight, with a serous effusion, in contrast to the purulent effusion in perforation of the appendix. The perforation may be very minute and can occur apart from obstruction ; in some cases a localized abscess may form. Because of the high operative mortality the author is becoming increasingly conservative in treatment. In the presence of gross abdominal distension operation is essential, but where distension is not pronounced and the obstructing lump of worms is palpable conservative treatment with anthelmintics, stomach suction and parenteral fluid administration is often adequate to achieve a cure. When operation is undertaken and a worm mass is found, a decision has to be made either to incise and evacuate the worms or to break up the mass by external kneading with subsequent expulsion by the aid of anthelmintics. The decision will depend on the state of the intestine ; where there is obvious ischaemia it is safer to incise and the incision must be made above the segment distended by the worms. The author operated on 6 of his cases, with the loss of 3 from neglect of this precaution.

W. L. Harnett

JAQUES, W. E. **Relationship of Nematode Larvae to Generalized Sarcoidosis. Report of a Case and Review of the Literature.** *Arch. Pathology.* 1952, June, v. 53, No. 6, 550–57, 3 figs. [Refs. in footnotes.]

"A case of sarcoidosis has been presented which probably represents a response to nematode larvae. In connection with this case, the formation of a Schaumann body has been depicted, probably for the first time. Three additional cases in which chitinous material was considered to be present have been described briefly. The portion of the literature pertaining to helminths that has a bearing on sarcoidosis has been reviewed. The geographic distribution of cases of sarcoidosis and nematode infestation, the organs involved, the histologic appearance of involved tissues, and the laboratory observations are considered to favor a cause-effect relationship in some cases."

JAQUES, W. E. **Sarcoidosis. A Review and a Proposed Etiologic Concept.** *Arch. Pathology.* 1952, June, v. 53, No. 6, 558–92, 7 figs. [Refs. in footnotes.]

QUTUB-UD-DIN, M. **Epidemiology of Filariasis in Medak District Hyderabad (Deccan).** *Pakistan J. of Health.* 1951, Oct., v. 1, No. 3, 27–33. [10 refs.]

"1. The gross disease rate in the area surveyed is 1·05%. The highest filarial disease rate is 5%. It shows no predilection for either sex.

"2. The filarial infection is higher in the males (9·2%) than in the females (6·3%).

"3. In complete agreement with the previous findings the highest incidence of disease is in the group (46–50).

"4. Earliest age at which filarial infection is detected is 10 months.

"5. The endemicity rate in the different villages ranged from zero to 21·4%.

"6. The predominant pathogenic helminth is *Mf. bancrofti* and the vector *C. fatigans* which breeds in cesspools and rotting wells."

BLUMBERG, B., MCGIFF, J. & GUICHERIT, I. **Filariasis in Moengo (Surinam) in 1950.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, Dec., v. 3, No. 4, 368–72, 1 graph.

Of a total of 1,966 persons examined at Moengo, Surinam, for the presence of microfilariae of *Wuchereria bancrofti*, 272 (13·7 per cent.) were found positive. Those examined comprised employees (1,013) of the Surinam Bauxite Company and their families (953) and the infection rates in these two groups were 14 and 13·3 per cent. respectively. Thick blood smears, stained with Giemsa, were taken at night between 10 and 11 p.m. except in the case of night workers, from whom blood was taken during the day.

The age-group incidence of the infection showed a marked rise in the 6 to 15 group and a fairly uniform incidence in subsequent groups. The incidence in males and females was 13·4 and 14·7 per cent. respectively.

Analysis of race incidence revealed by far the highest rate in Creoles, namely 20 per cent. of 606 employees and 17 per cent. in 710 of their relatives. Creoles and Indonesians are the numerically predominant races in the population. The incidence in the latter was 4·5 per cent. in 310 employees and 2·6 per cent. in 150 relatives. Hindus, Chinese, Whites and American Indians form only a small proportion of the people. Next highest to that of the Creoles was the incidence in American Indians, namely 6 (21 per cent.) of 28 employees and 2 (6·9 per cent.) of 29 relatives.

Investigation of the incidence in members of the two major groups living in Moengo under similar environmental, social and economic conditions showed that Creoles, with 18·5 per cent. of 1,278 examined, still far exceeded Indonesians, whose incidence was 3·6 per cent. of 249 examined ; but whether this difference is due to a racial or an environmental factor has yet to be decided.

J. J. C. Buckley

Conn, H. C. & Greenslit, F. S. **Filariasis Residuals in Veterans with Report of a Case of Microfilaremia.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 474–6.

"1. A case of non-symptomatic microfilaremia due to *Wuchereria bancrofti* is reported approximately seven and a half years after exposure to infection.

"2. The objective residuals of infection in 87 cases of filariasis in veterans consist of lymph node enlargment in all cases, especially axillary. Rarely, slight swelling of the affected limbs was demonstrable.

"3. The subjective symptoms were complaints of dull pain and swelling of the affected parts after exertion, and anxiety related to the genital organs. The patients were not exercised so that it is possible that some of the complaints concerning swelling may have a foundation in fact.

"Since this paper was submitted for publication, a second case of microfilaremia has been found. This veteran showed no periodicity over a 24 hour study period. Concentration studies of whole blood with saponin revealed from 4 to 7 microfilariae per cubic centimeter in each of 8 samples, while direct fresh smears and thick drop stains only revealed one parasite in 6 examinations during the same period. The veteran was asymptomatic."

Faust, E. C., Agosín, M., Garcia-Laverde, A., Sayad, W. Y., Johnson, V. M. & Murray, N. A. **Unusual Findings of Filarial Infections in Man.** *Amer. J. Trop. Med. & Hyg.* 1952, Mar., v. 1, No. 2, 239–49, 17 figs.

This report deals with 4 unusual findings of filarial worms in man.

The first is claimed as unique. It is therefore presented in some detail. The blood specimens from which these microfilariae are described were taken from a European female, 60 years of age, who had lived in Haiti and in Colombia. For a period of 20 years she had been afflicted with recurrent oedematous erysipelas of both legs and, for the last 15, of the hands and forearms. There was no evidence of lymphangitis or lymphadenitis. Fifteen thick blood films were taken, under aseptic conditions, at 10 a.m. and they were negative ; but preparations [? number] made at 2 a.m. the following morning revealed objects which were at first diagnosed as microfilariae. In wet-drop preparations the nematodes were sluggishly motile, and slight pressure of the coverglass proved them to be extremely friable. Morphologically they resembled microfilariae, but were considerably larger, while more mature specimens proved to be rhabditoid larvae. The youngest had a diameter of approximately 11 μ : the next stage 16 μ and the most advanced 21 μ. This latter revealed transverse cuticular striations. All other specimens were developing and mature rhabditoid larvae. The most advanced had a length of 0·66 mm., a maximum diameter of 26 μ and a complete digestive tract. At the anterior end there was a well-developed oesophagus and a distinct nerve ring. It is suggested that these nematodes closely resemble the larval stages of *Wuchereria* in the mosquito host and that, in fact, they represent the immediate post-microfilarial and early rhabditoid stages of a filaria which had developed precociously in the definitive host.

[The suggestion also made that these nematodes may well be contaminants appears to be probably correct. The similarity of the organisms described to free-living nematodes is too strong to be lightly set aside. The reviewer has had a somewhat similar experience with regard to filariasis in the Pacific where the contamination was probably due to the use of distilled water which had been stored too long in the laboratory under tropical conditions. In the present case the possibility that the nematodes were originally present in the distilled water used for dehaemoglobinization of the thick-blood films cannot be discarded. The various stages of development of the worms seen, the large numbers present, the double-bulb oesophagus, the mouth capsule and tapering tail—all would suggest this explanation. See Manson-Bahr, this *Bulletin*, 1952, v. 49, 788.]

The second example was obtained at autopsy from a 34-year-old Negro who died of lymphatic leukaemia in March 1948. In an area of consolidation in the upper lobe of the right lung a thread-like nematode protruded, which was found to reside in a small dilated artery. In diameter it ranged between 0·4 and 0·5 mm. Two of the cross sections showed that the uterus contained embryonating eggs. It is suggested that the worm may have been *W. bancrofti* in an ectopic location. Had it been larger it could have been considered as a *Dirofilaria*. [To the reviewer this latter would appear the most probable explanation. The illustration of the worm protruding from the pulmonary consolidation affords the impression of being too thick and too massive for *W. bancrofti*. According to the measurements given it is about twice the thickness of published records of type specimens of adult female *W. bancrofti*.]

Under the caption of " Filarias from Superficial Nodules " two instances are recorded. The first was recovered from a cyst of the left upper eyelid of a 19-year-old European girl in Florida. The nodule, which measured 11 by 8 by 7 mm. contained a thread-like worm 50 mm. in length and irregularly coiled. Part of the worm submitted to Faust proved to be the anterior end of an immature female filaria with structural characters which would assign it to the genus *Dirofilaria* of which an example is *D. conjunctivae*.

The second filaria was from a superficial nodule, a lump on the arm of a European woman of 35 from Jacksonville. The worm was motile at the time of removal.

The specimen submitted consisted of 3 separate adjacent segments of a female filaria from which there protruded eviscerated portions of the uterus. The total length of the 3 portions was 69 mm. and the maximum diameter 0·26 mm. The filaria is also considered to be a specimen of *Dirofilaria conjunctivae*.

These two cases, while not unique, are the first records in the United States and both came from the east coast of Florida.

For absolute specific diagnosis examination of the posterior end of the male filaria is essential, and this was missing.

It is suggested that there might be aberrant forms of *D. immitis* in man, developing from larvae that have migrated within the skin and then have become immured by host-tissue encapsulation. This would explain why Dirofilariae normally found as adults in the right heart of the dog are from time to time recovered as immature forms in nodules of the human skin.

Philip Manson-Bahr

VAN DER HOEVEN, J. A. **Some Remarks on Filariasis, in relation to the Administration of ' Hetrazan '.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, June, v. 4, No. 2, 107–11, 1 fig.

" The author reports on the results of a 10-day treatment of filariasis patients in New Guinea with ' Hetrazan ' ; the dosage was 6 tablets of 50 mg. daily.

"All microfilariae were killed in a few days, but many relapses were observed two months later ; the dosage had been too low to destroy the parent-parasite(s)."

OTTO, G. F., BROWN, H. W., BELL, S. D., Jr. & THETFORD, N. D. **Arsenamide in the Treatment of Infections with the Periodic Form of the Filaria, *Wuchereria bancrofti*.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 470–73.

Twelve male Negro patients, with microfilariae in the blood, were treated with arsenamide. Four of them had hydrocele. They received 12–15 daily doses each containing 0·2 mgm. arsenic per kgm. body weight. By the end of this treatment the blood of 8 had become free from microfilariae and in the others there was a reduction of over 90 per cent. A few microfilariae persisted in some of the patients ; but after 12 months only 1 patient still showed a rare microfilaria in the blood.

Minor signs of toxicity were seen in 7 of the patients, *viz.* : nausea (6), vomiting (4), loose stools (2). Perivascular leakage produced local inflammation in 2 cases. One patient developed fever after the 12th dose but it only lasted 24 hours, and its cause is not clear. One patient developed tenderness and swelling of the scrotum after the 4th dose, which may have been due to the destruction of an adult worm.

In a previous paper [this *Bulletin*, 1949, v. 46, 68] the authors had reported 6 other patients treated in this way. Out of the 18 patients in the two series, 16 were free from microfilariae 11–17 months later, indicating that the adult worms had been killed or sterilized. The nausea, vomiting, and diarrhoea caused by the drug can be relieved or prevented by phenobarbital or ascorbic acid. [Arsenamide is p-(bis-[carboxymethyl-mercapto]-arsino)-benzamide. Although the authors consider it to be relatively non-toxic, the reviewer has heard of a case where the patient was taken ill after the third dose and died 8 days later with post-mortem appearances suggesting necrosis of the liver.]

F. Hawking

CHARDOME, M. & PEEL, E. Une nouvelle filaire chez l'homme au Congo Belge : *Tetrapetalonema berghei*, n. sp. [**A New Filarial Worm in Man in the Belgian Congo : *Tetrapetalonema berghei***] *Ann. Soc. Belge de Méd. Trop.* 1951, Dec. 31, v. 31, No. 6, 571–7.

A single female filarial worm was recovered from the wall of the bladder of a man at Coquilhatville, Belgian Congo. The specimen is described and reported to be a new species, *Tetrapetalonema berghei*. The 4 caudal protuberances resemble very closely those of *T. atelensis* McCoy, 1936, a parasite of *Ateles* spp. In addition to microfilariae of *D. streptocerca*, from skin scarifications of the human host of the adult female worm, microfilariae of *D. perstans* were found in blood smears together with a rare form very similar to the microfilariae of *D. perstans* and identical with uterine microfilariae from the adult worm. The latter two are described and differentiated in tables and diagrams.

J. J. C. Buckley

VAN DEN BERGHE, L. Remarques sur *Tetrapetalonema berghei* Chardome et Peel. [**Observations on *Tetrapetalonema berghei***] *Ann. Soc. Belge de Méd. Trop.* 1951, Dec. 31, v. 31, No. 6, 577–80, 4 pls.

Commenting on the discovery of *T. berghei* [above] van den Berghe thinks that the true incidence of this species is likely to be masked by the close resemblance of its microfilariae to that of *D. perstans*. *J. J. C. Buckley*

CHABAUD, A. G. Le genre *Dipetalonema* Diesing 1861 ; essai de classification. [**Attempts to Classify the Genus Dipetalonema**] *Ann. Parasit. Humaine et Comparée.* 1952, v. 27, Nos. 1, 2 & 3, 250–85, 8 figs. [Bibliography.]

In this praiseworthy attempt to resolve some of the confusion which attaches to the taxonomy of the genus *Dipetalonema* Diesing, 1861, and related genera, the author approaches the problem from the evolutionary aspect and relies on morphological characters which appear to him to have phylogenetic value rather than those which, though more easily observed [and therefore more readily adaptable to the formation of dichotomous keys and such-like "aids to diagnosis"], may be the result of the influence of convergent evolution and may give an untrue picture of the relationships of different genera and species.

Having explained the principal causes of the confusion, one of which was the incorrect placement of *Dipetalonema* in the subfamily Setariinae, he redefines this genus in a way which gives it wider scope and allows it to embrace in synonymy the genera *Acanthocheilonema*, *Tetrapetalonema* and *Loxodontofilaria*. Other genera are discussed in the light of the new definition. The author proceeds to define the morphological characters which in his view are of phylogenetic significance. Special emphasis is laid on the structures of the cephalic region, *viz.*, the circumoral papillae, the mouth capsule, the oesophagus and the position of the vulva. The species of the genus *Dipetalonema* are then reviewed and are dealt with under the host orders of marsupials, edentates, ungulates, carnivores, rodents, insectivores and primates. He describes a new species *D. blanci* from the subcutaneous tissue of *Meriones libycus*. Of particular interest and importance for the medical helminthologist is his redescription of *D. perstans*, based on two males and fragments of 6 females recovered in 1902 by E. BRUMPT in the Congo, from the mesentery and surface of the kidney of a woman. In this ample description the circumoral papillae and caudal papillae in the male are figured in satisfying detail and the posterior extremity of the female tail is shown to possess 4 cuticular appendages, not 2 as hitherto believed, while the same region of the male presents quite a different appearance. A detailed description is also given of the pericloacal and terminal papillae of the male tail of *D. gracile*, based on specimens recovered from *Cebus fatuellus*.

The paper concludes with a presentation of other morphological and biological data to support the author's main thesis of classification based on evolution.

In an addendum, reference is made to the recently published account of a new *Tetrapetalonema* from man, *T. berghei*, by CHARDOME and PEEL [above]. The single female described by these authors is identical with the material of E. Brumpt described in the present work as *D. perstans*, which included two male worms. It is concluded that *T. berghei* is synonymous with *D. perstans*.

[Under the heading "Little known species" (p. 276) the author includes *Dipetalonema streptocerca* and states that it is only known from the description of females attributed to this species by Peel and Chardome in 1946 (this *Bulletin*, 1947, v. 44, 339). It is evident that the author was then unaware of the subsequent publication of Peel and Chardome in 1947 in which 3 male worms were recorded and described as *D. streptocerca* (*ibid.*, 1948, v. 45, 809). This lapse would account for his lack of reference to *D. rodhaini* which was described as a new species by Peel and Chardome in the same article.] *J. J. C. Buckley*

HUGHES, T. E. **The Morphology of the Gut in** *Bdellonyssus bacoti* **(Hirst, 1913) Fonseca, 1941.** *Ann. Trop. Med. & Parasit.* 1952, May, v. 46, No. 1, 54–60, 9 figs. [17 refs.]

McMahon, J. **Phoretic Association between Simuliidae and Crabs.** [Correspondence.] *Nature.* 1952, June 14, 1018.

The author refers to his earlier work on phoretic association between the early stages of *Simulium neavei* and freshwater crabs (*Potamon niloticus*) [this *Bulletin*, 1952, v. 49, 73]. He believed that *S. neavei* was the only species living in a state of phoresis with the crab : a survey in Kakamega, Kenya, however, revealed that, surprisingly, phoresis was observed in open rivers many miles away from the wooded water of the focus under survey. The larvae and pupae found closely resembled those of *S. neavei*, but subsequent identification of the adults showed them to be those of *S. nyasalandicum*. Later, larvae and pupae were found to exist in the exhalant passage of the bronchial chamber of some of the crabs. This was at first thought to be an accidental ingression, but again it proved to be due to a third species, *S. woodi*.

Both of these species have points of morphological difference from *S. neavei* and from each other and these are briefly described.

It is added that descriptions of the females of both species were recorded by de Meillon in 1950, but the males and the earlier stages have yet to be described : this is to be done in the near future. *H. J. O'D. Burke-Gaffney*

Gibson, C. L. **Comparative Morphology of the Skin-Inhabiting Microfilariae of Man, Cattle, and Equines in Guatemala.** *Amer. J. Trop. Med. & Hyg.* 1952, Mar., v. 1, No. 2, 250–61, 16 figs. on 3 pls.

Three species of Simulium—*S. metallicum*, *S. ochraceum* and *S. callidum*—commonly bite man in Guatemala and are regarded as vectors of American onchocerciasis, but also feed avidly on animals, particularly horses and cattle—all 3 of which harbour microfilariae in the skin. Therefore naturally-infected flies from this region may acquire infection from any of these 3 sources. It proved impossible to induce any of these flies to feed in captivity. Therefore dissection of wild-caught insects had to be resorted to.

For the purpose of this study 8 horses and as many cows, together with one heavily infected human volunteer, were selected for study. Thick blood films made from the ear, tissues removed from skin of neck, ear and shoulders were fixed in Bouin's solution together with numerous skin biopsies taken from the same regions of the body. Specific identification of the microfilariae found in the skin of the 3 host species was established by comparing them with microfilariae taken from the uteri of gravid *Onchocerca* females obtained from human subcutaneous tumours as well as from the ligamentum nuchae of cattle and horses.

Skin biopsies revealed microfilariae in 12 per cent. of horses and cattle in the area : also, 87·2 per cent. of 148 cattle from the local abattoirs harboured males and females of *O. gutturosa*. In 3 horses *Onchocerca reticulata* (*cervicalis*) was embedded in the ligamentum nuchae.

No microfilariae were found in the blood of any of the 3 hosts. They were not evenly distributed throughout the skin ; their location was often just below the papillary layer of the dermis and they had a tendency to be distributed in nests. Larvae of *O. gutturosa* and *O. reticulata* from skin biopsies emerged more slowly than those of *O. volvulus* from human skin.

Microfilariae of *O. volvulus* tend to be larger than those of *O. gutturosa* and *O. reticulata*, ranging from 210 to 300 μ. Those of *O. gutturosa* fall into an intermediate size group from 189 to 251 μ. The size range of *O. reticulata* is

extensive from 179 to 266 μ. In microfilariae of *O. volvulus* the width is considerably greater than the other two species. Since microfilariae vary considerably in their total length, the distance of the various structures from the head end is expressed in terms of percentage of total length.

The nerve ring, the G_1 cell, the anal pore and termination of the nuclear column are so similarly located in the three species that no distinction can be made. The form, size and arrangement of the cephalic and caudal nuclei do present characters which, in conjunction with the greater width of *O. volvulus*, permit of the separation of the 3 species. Wet fixation followed by iron haematoxylin stain produces the most satisfactory results for this purpose.

In *O. volvulus* microfilariae the two most anterior nuclei are variable, being arranged tandem or abreast. Those of *O. gutturosa* have two large anterior tandem nuclei, followed by a single large nucleus in the mid-line : those of *O. reticulata* usually have a large solitary nucleus followed by a tandem pair. The tail nuclei show distinct differences amongst the three species. In *O. volvulus* the pattern consists of two medium-sized terminal nuclei, one behind the other, preceded by one or two discrete, larger nuclei in file. Microfilariae of *O. gutturosa* have a long terminal bar, which really consists of four small discrete nuclei. This is preceded by a chain of large, quadrangular nuclei which are more or less confluent. The microfilariae of *O. reticulata* have a terminal bar that never becomes resolved into small discrete nuclei. It is preceded by a chain of small, distinct, triangular nuclei. Their entire appearance is more delicate than that in *O. gutturosa*. The paper is illustrated by several figures.

Philip Manson-Bahr

GOETERS, W. Untersuchungen an Enterobien (Oxyuren). 2. Mitteilung. Das Infektionsgeschehen bei der menschlichen Enterobiasis unter besonderer Berücksichtigung biologischer Gesichtspunkte. [**Studies on *Enterobius*. Part 2. Occurrence of Infection in Man**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 508–37, 3 figs. [34 refs.]

The English summary appended to the paper is as follows :—

" 1593 children were searched for eggs of Enterobius (Oxyuris) in a sanatorium of Norderney, Germany. Purpose of investigation was to test and compare various procedures of finding egg deposits in the perianal folds. Cellophane tape method (Graham, Jacobs) proved by far superior to stamp method (Schüffner) and NIH- swab method (Hall) which ranked lowest. Practically all cases of Enterobius infection could be detected by cellophane tape method in one single examination. There was a direct numeral relation of egg deposits and adult pin-worms in the feces, although generally no worms were found when the egg count was below 250. Relation of male and female worms was 1 to 9. Best egg findings were obtained when the cellophane tape was applied early in the morning.

" Precise figures and statistical calculations are given. The Lancaster formula for calculating endemic infection index by serial and unrepeated examination as established for amebiasis is also valid for enterobiasis."

LANDTMAN, B. Blåbär mot oxyuriasis. [**Bilberries in the Treatment of Pin-worms**] *Nordisk Med.* 1952, May 16, v. 47, No. 20, 673–5. [17 refs.] English summary.

Thirty children between the ages of 2 and 15 years who were suffering from enterobiasis were treated with a diet of bilberries. In 14 children the infestation

had been present for over a year, and 25 had had several relapses which had not responded to various forms of treatment. The bilberries were given fresh or cooked, and the diet was continued for 3 days ; the daily consumption of bilberries ranged from ½ to 2 litres, and 100 cc. of milk were allowed each day in addition. No other food was permitted. During the winter dried or preserved fruit was used. Eighteen children received the diet in hospital or other institutions, and the remainder were treated at home. The patients were subsequently observed over periods ranging from 14 days to 5 years. Many worms were eliminated after the first day of treatment. In 26 cases the treatment appeared to be successful ; no worms could be found a few weeks after the treatment had been carried out, and the symptoms disappeared. In the 4 unsuccessful cases the patient had been treated at home, and there was some doubt as to whether the diet had been properly given. *D. J. Bauer*

ŻARZYCKI, J. Zmiany histologiczne tkanki mięśniowej przy zakażeniu włośniami (*Trichinella spiralis*). [**Histological Changes in the Muscle Tissue following the Infection with** *Trichinella spiralis*] *Ann. Univ. Mariae Curie-Skłodowska.* Lublin. Sect. DD. 1951, v. 6, Nos. 6/14, 155–76, 10 figs. [12 refs.] English summary.

In serial sections of diaphragm muscles of white mice infected with *T. spiralis*, it was found that before penetration the larvae caused granular degeneration. They entered the damaged muscle by the 7th day. The lesions in the muscle fibres were (*a*) direct, manifested by granular degeneration and coagulation necrosis of a hyaline type : vacuolation or encystation occurred, (*b*) indirect, in the form of ceraceous degeneration before the appearance of the larvae can be demonstrated.

The formation of the capsule of *T. spiralis* is described, but the histological details are not quite clear in the English summary.

H. J. O'D. Burke-Gaffney

DAVIS, W. M. & MOST, H. **Trichinosis. Case Report with Observations of the Effect of Adrenocorticotropic Hormone.** Reprinted from *Amer. J. Med.* 1951, Nov., v. 11, No. 5, 639–44, 4 figs. [15 refs.]

" A case report of a patient with severe acute trichinosis is presented. The patient was observed before, during and after a period of administration of ACTH. Clinical improvement occurred coincident with the use of ACTH and was for the most part sustained during the period following its use.

" Observations of the extent and character of the muscle invasion and concomitant diffuse myositis were made and are discussed. The eosinophilia so characteristic of the disease fell slowly during the administration of ACTH. Progressive rise of antibodies occurred.

" It is believed that distinct benefit occurred as a result of the course of ACTH. The possible mechanisms of its action in trichinosis are briefly discussed. It is suggested that ACTH be tried in future cases of trichinosis to assess further its possible beneficial role."

DEFICIENCY DISEASES

i. Gopalan, C., Venkatachalam, P. S., Rao, K. S. & Menon, P. S. **Studies on Nutritional Edema. Clinical, Biochemical and Pathological Observations.** *Indian J. Med. Sci.* 1952, May, v. 6, No. 5, 277–95, 10 figs. (6 on pl.) [17 refs.]

ii. Chakravarti, H. S. **Studies on Plasma Protein in Malnutrition with special reference to Nutritional Oedema.** *Calcutta Med. J.* 1952, Mar. & Apr., v. 49, Nos. 3 & 4, 91–101 ; 146–53, 4 figs. [52 refs.]

i. Thirty-nine cases of nutritional oedema occurring mostly in destitute males in South India were investigated. Levels of plasma protein were low, with an average of 5·2 gm. /100 ml. (range 3·9 to 6·8). The fall was almost entirely due to a fall in the albumin fraction. The average blood albumin was 2·8 gm. /100 ml. (range 1·5 to 4·9). These figures are much below acceptable normal standards. However, there was no correlation between the severity of the oedema and the fall in serum albumin.

[The clinical description, therapy with the emphasis on milk and milk products, and pathological findings (there were 5 deaths) follow lines that are rapidly becoming orthodox. The chief interest in the paper is the demonstration that nutritional oedema occurring sporadically in the destitute population of South India does not appear to differ fundamentally from the oedema found in famines in other parts of the world. The accounts of diagnosis and treatment are concise and well set out and so will be of special value to practitioners in South India.]

ii. Total plasma protein and plasma albumin and globulin were determined in 37 patients in Calcutta suffering from various manifestations of malnutrition of whom 27 had oedema. There was a marked reduction of the albumin fraction and the degree of oedema was closely related to the blood albumin levels. Thus mean albumin levels in gm. per cent. were 1·2 with severe oedema (4 cases), 1·7 with moderate oedema (9 cases), 2·5 with mild oedema (14 cases) and 3·3 in 10 cases with various manifestations of malnutrition but no oedema. By means of Govaert's formula the osmotic pressures exerted by the plasma proteins were calculated. In 23 cases the value was below 18 mm. of mercury and all but one of these patients had oedema. In 5 with higher values oedema also occurred. Although discrepancies were present and the relationship was not clear-cut, the association between oedema and hypoproteinaemia was much closer than in many recent studies and "in general, Starling's theory holds good in the production of nutritional oedema in man". Foods rich in protein were most effective therapeutically, but plasma and plasma substitutes were also beneficial. [These two papers show that both in Calcutta and in South India in a series of cases of nutritional oedema there is a low mean level of albumin in the blood. Whereas in Calcutta there was some association between individual levels of albumin and the severity of the oedema, in South India there was none. A probable explanation of this apparent discrepancy is that there are several factors in nutritional disorders giving rise to increase of extracellular fluid. Of these a low level of blood albumin is one : in Calcutta it is perhaps the main factor, whereas in South India it is only an important contributory cause and other factors operate.] *R. Passmore*

Gilroy, A. B. **A Survey of Child Nutrition on Tea Estates in Assam.** *Indian J. Med. Res.* 1951, July, v. 39, No. 3, 361–75. [19 refs.]

In 1948 and 1949, 4,191 children living on 44 tea estates in the Brahmaputra valley were examined. Xerophthalmia (69·7 per cent.), dry skin (15·9 per cent.),

achromotrichia (19·8 per cent.), and circumcorneal injection (13·6 per cent.) were the main findings. Phrynoderma was not observed and angular stomatitis was rare. There was no association between the incidence of dry skin and xerophthalmia. Only one case of keratomalacia was found and, in view of the high incidence of xerophthalmia, this is evidence that the latter is not a stage in its development. The author points out that from this survey no clear cut picture has emerged correlating the clinical signs with the basic diet and degree of parasite load among the children. [Although the precise significance of the various signs remains uncertain, there is no doubt that their incidence in a large group of children remains a rough measure of nutritional status.]

R. Passmore

WALTERS, J. H. & SMITH, D. A. **Oedematous Beri-Beri in Gambian Palm Wine Tappers.** *West African Med. J.* 1952, Jan.–Feb.–Mar., v. 1 (n.s.), No. 1, 21–8, 4 figs.

The tapping of the oil fruit bearing palm (*Elaeis guineensis*) for its sap is a minor industry in parts of the Gambia. The professional tappers, who have to climb 15–20 trees of height up to 50 feet daily, work hard. They often drink up to 9 pints a day of the unfermented juice and, in addition, large amounts of the fermented liquor. Rice is their staple food with a little fish, but vegetables, other cereals and meat are rarely eaten. This diet is low in vitamin B_1 and often high in calories.

Oedema is not uncommon among the tappers and, as it is not associated with either congestive heart failure or renal failure, and as vitamin B_1 (10 mgm. a day) brings about a prompt diuresis, it is concluded that this is a form of beri-beri. It is suggested that the primary mechanism of the oedema in subacute wet beriberi is a peripheral vascular disorder. Four cases are described in detail.

R. Passmore

TURHAN, B. Bir pellagra vak'asi münasebetiyle. [**Intestinal Lesions in Pellagra**] *Tip Fakültesi Mecmuasi* (*Bull. Facul. Méd. Istanbul*). 1952, v. 15, No. 1, 101–5, 1 fig.

The English summary appended to the paper is as follows :—

" The intestinal lesions in pellagra are observed by a few workers. However the ulcers, located especially in the lower parts of the small intestine resembling typhoid ulcers are very rare. Therefore we found it suitable to publish this kind of lesion which we have had the opportunity of examining in a case of pellagra.

" It is thought that these intestinal lesions are due to vitamin deficiency and functional disturbance of this organ. The fact that these lesions are different in form is due to and depends on, both the changes of the amount of nicotinic acid in the organism, and, partly, on the duration of these changes. On the other hand the changes in the environment and in the intestinal content and the influence of the intestinal flora play a great role in the formation and enlargement of these ulcers."

BROCK, J. F. & AUTRET, M. **Kwashiorkor in Africa.** *Bull. World Health Organization.* Geneva. 1952, v. 5, No. 1, 1–71, 11 figs. [75 refs.]

Readers of this *Bulletin* over the last 5 years will be familiar with many reports from Africa and elsewhere describing a clinical syndrome resembling kwashiorkor. Some stress the resemblances with the original account by Cicely WILLIAMS in 1933 from the Gold Coast : others stress the differences. The problem as to whether kwashiorkor is or is not a disease *sui generis* has been hotly debated, but

mostly by persons whose experience was limited, of necessity, to one district. It was therefore very appropriate for the United Nations through the Joint FAO/WHO Expert Committee to send a team consisting of the Professor of Medicine in the University of Cape Town (Brock) and the Chief of the Area & Field Branch, Nutrition Division F.A.O. (Autret) to tour Africa extensively and report on the findings of the nature of the disease in different countries.

The chief conclusion of Brock and Autret is that kwashiorkor is a nutritional syndrome common among the African peoples, in which characteristically there occurs :—

"(a) retarded growth in the late breast-feeding, weaning, and post-weaning ages, with
(b) alterations in skin and hair pigmentation,
(c) oedema,
(d) fatty infiltration, cellular necrosis, or fibrosis of the liver,
(e) a heavy mortality in the absence of proper dietary treatment, and
(f) the frequent association of a variety of dermatoses."

It is perhaps the variety of the dermatoses, in part determined by vitamin deficiencies and in part by trauma, which has been responsible for the difficulties and delay in the recognition of kwashiorkor as a distinct disease. Brock and Autret have written a full-scale account of the epidemiology, general clinical features, pathology and treatment of the disease, and illustrated the story with beautiful clinical photographs. Their journeys have shown that the resemblances in the disease manifestations in the various parts of Africa far outweigh the differences. It is no longer permissible to regard kwashiorkor as a local disease. But many textbooks of general medicine and of paediatrics and of tropical diseases as yet give little space to the disease. Authors and editors of such books, who are not personally familiar with kwashiorkor, should read Brock and Autret before bringing out their next edition.

Though this review has tidied up elegantly the main features of the medical problem, it only points the way broadly to the educational, agricultural and social problems, which determine nutrition and so lie behind each individual suffering child. If the Africans are to take their proper place among the communities of mankind and become a people *primus inter pares* with those whose civilizations are now more advanced, then kwashiorkor must be eradicated from the continent. This means a revolution in mothercraft and several revolutions in agriculture throughout the continent. The drive and energy for such changes must come from the Africans themselves. Experts like Brock and Autret can provide the detailed technical knowledge, but the necessary enthusiasm and drive to tackle these great problems must come from within. It is to be hoped that this report will be studied by Africans with the care which it merits.

[This paper has also appeared in mimeographed form.] *R. Passmore*

SPRUE

ASENJO, C. F. **Criteria for assessing Fat Absorption in Normal Subjects and Sprue Patients.** *Amer. J. Trop. Med. & Hyg.* 1952, Mar., v. 1, No. 2, 344–54. [26 refs.]

At present there are indications that faecal fat in normal human beings and animals is of endogenous origin.

MÜLLER's (1884, 1893) early experiments with dogs and professional human fasters demonstrated that stools contained fat even during starvation. SHAPIRO

and others showed that from 65 to 70 per cent. of fat in the diet of human beings was absorbed even in the absence of bile and that the majority of faecal fat originated from fat secreted into the intestinal lumen.

The intestinal threshold appears to lie in the neighbourhood of 200 gm. per day. When the dietary fat is low in saturated fatty acids and the level of fat intake is varied within ordinary limits (40–150 gm. per day) the faecal fat excretion and therefore the percentage fat absorption, are not greatly altered in the average normal adult.

Sprue patients, when maintained on a low fat diet, excrete the same amount of fat in the stools as do normal subjects [BLACK, FOURMAN and TRINDER, this *Bulletin*, 1946, v. 43, 667]. This indicates that the abnormally high content of fat in the stools of sprue patients on a normal ration is largely of dietary origin. The purpose of the present investigation has been to compare the value of percentage fat in dried faeces against percentage fat absorption as an index for assessing fat absorption in normal subjects and sprue patients.

The first series consisted of 19 normal persons and 41 sprue patients. The percentage of fat in dried faeces, the partition of the same into split fat, neutral fat and unsaponifiable matter, were determined.

Twenty-four-hour stools were collected. The methods of Keye, Leibner and Connor and the wet method of Saxon, as modified by the authors, were employed.

Determinations were made of the percentage of split and neutral fat, as well as unsaponifiable matter in the fat residue. Total solids were determined in a separate sample of faeces by drying at 110°C. for 24 hours. Methods are described briefly.

In the second series 7 normal persons and 7 sprue patients underwent fat balance trials. These lasted 3, and some as long as 17, days. Both groups received the sample experimental ration—in the neighbourhood of 90 gm. of fat per day.

Twenty-four-hour samples of stools were collected. Before starting and after finishing the trials, patients were kept on a liquid low-fat diet for 24 hours. In the first series of 41 sprue patients so studied, only 12 showed a percentage of fat in dried faeces above 30 per cent. When a normal subject is consuming an average diet, the normal upper limit of fat in dried faeces has been considered to be 30 per cent. Figures such as these indicate that the determination of percentage of fat in faeces is not satisfactory for evaluating fat loss and fat absorption ; but when a sprue patient is placed on a controlled diet and a record is kept of the exact fat intake and of the collection, weight and analysis of stools, it becomes possible to relate fat intake to fat output as in the expression :—

$$\frac{\text{dietary fat intake} - \text{faecal fat output}}{\text{dietary fat intake}} 100 = \text{apparent fat absorption.}$$

The metabolic fat excretion does not usually amount to more than 4 gm. per day.

Should it prove impossible to keep the patient on an intake of at least 40 gm. of fat per day, a correction should be made by subtracting the metabolic fat from the faecal fat output.

It is concluded that the average normal subject absorbs well over 90 per cent. of its dietary fat intake. The percentage of solids in fresh faeces averaged 18·6 per cent. in normal persons, while in sprue it was 11·8 per cent. However, the total quantity of solids passed by sprue patients was roughly twice as much as that passed by normal subjects.

From data collected in the fat balance experiments the percentage of fat in dried faeces was calculated. The values obtained for the normal subjects was 15·9 per cent. and for sprue, 27·3 per cent. These results confirm the conviction that the percentage fat in dried stools is a very unreliable index for measuring fat absorption because the values do overlap a great deal. Daily fat excretion was 12·5 gm. in sprue patients and 4·0 gm. in normal subjects. The average apparent fat absorption of sprue patients was 60·2 per cent. and for the normal persons this value was 94·3 per cent.

Faecal fat distribution was studied in a series of 19 normal persons and 41 sprue patients. The values for neutral fat were practically the same for both groups. The sprue cases had an average percentage unsaponifiable in the faecal lipids about one-half as large as that observed in normal subjects. The average split fat in sprue was somewhat higher than normal, but the presence in the faeces of volatile fatty acids arising from carbohydrate fermentation might explain this increase of split fats in the faecal lipids of sprue patients. A disturbing factor was the wide variation exhibited between individuals.

Philip Manson-Bahr

Diéz Rivas, F., Suárez, R. M., Hernández Morales, F. & Pérez Santiago, E. **The Oral Administration of Vitamin B_{12} in Tropical Sprue.** *Ann. Intern. Med.* 1952, Feb., v. 36, No. 2, Pt. 2, 583–91. [11 refs.]

Vitamin B_{12} when given by the mouth has a definite but limited haemopoietic activity in sprue, and it was found that gastric juice potentiated the haemopoietic activity of orally administered vitamin B_{12} in 2 cases out of 3.

Small single doses (15 to 50 μgm.) given alone by mouth failed to induce response in 2 cases out of 8. Similarly large single doses of vitamin B_{12} (90 to 450 μgm.) failed to induce a response in 3 out of 4 cases when given alone by the mouth. Large multiple daily doses of 100 to 400 μgm. given by mouth to 2 patients induced a suboptimal response.

In sprue the approximate minimal dose of vitamin B_{12} needed to produce an appreciable reticulocytosis and definite clinical improvement is between 150 and 200 μgm. daily for at least 2 to 3 weeks or longer.

Fifteen mgm. of folic acid by mouth daily or 15 μgm. of vitamin B_{12} intramuscularly are more potent haemopoietic agents than the oral administration. The potentiating haemopoietic action of gastric juice on orally administered vitamin B_{12} seems to be inferior to the results obtained with pernicious anaemia by Castle.

The oral use of vitamin B_{12} is not recommended. *Philip Manson-Bahr*

Suárez, R. M. **The Comparative Effect of Vitamin B_{12} administered through different Routes in Tropical Sprue.** *Internat. Ztschr. f. Vitaminf.* Berne. 1952, v. 23, No. 3, 308–18, 6 pls.

The effective oral dose of vitamin B_{12} in sprue is probably 200 times as large as the effective intramuscular dose.

Sprue patients have been maintained in good clinical and haematological remission by parenteral administration of vitamin B_{12} in an average weekly dose of 15 μgm.

It is well known that substances injected into the bone marrow cavity are absorbed as rapidly as those administered intravenously; the author obtained interesting results in a small series by this route: slightly more maturation occurred at the site of injection than in marrow aspirated from a distant bone.

Ninety μgm. vitamin B_{12} in 1 cc. saline were injected into the sternal marrow. Changes 8 days after the injection showed slight evidences of maturation.

Another patient was treated in a similar fashion by the injection of 15 μgm. vitamin B_{12} in 1 cc. saline into the marrow cavity of the right iliac bone.
Philip Manson-Bahr

COHEN, B. S., MEYER, L. M. & FADEM, R. **Sprue Refractory to Vitamin B_{12}; Satisfactory Response to Folic Acid.** *Ann. Intern. Med.* 1952, June, v. 36, No. 6, 1533–7, 1 fig. [15 refs.]

"The rôle of the antianemic agents, folic acid, 5-methyl uracil (thymine) and vitamin B_{12} in the treatment of macrocytic anemia is discussed. A case is presented with macrocytic anemia and many of the clinical features of sprue, refractory to large oral and intramuscular doses of vitamin B_{12}, with complete clinical and hematologic response to folic acid."

HAEMATOLOGY

DIERCKX, F. Considérations sur l'anémie hypochrome en Afrique Equatoriale. [**Observations on Hypochromic Anaemia in Equatorial Africa**] *Bruxelles-Méd.* 1952, June 22, v. 32, No. 25, 1321–4.

In 100 young adult Africans in Coquilhatville, Belgian Congo, red blood counts averaged 5·18 million per cmm., varying between 7·4 and 3·2 m. Haemoglobin levels in the region varied from 7·6 gm. to 16·1 gm. and averaged 12·5 gm., and there was no significant difference between 10 patients with hookworm eggs in the stools and 10 without. The implications of this are discussed, with brief reference to the literature.

The author concludes that the lowered haemoglobin content of the red cells is due to a dietetic deficiency and not to ankylostomiasis, and that the polycythaemia is a compensatory mechanism. [See also this *Bulletin*, 1951, v. 48, 398.]
C. C. Chesterman

VAN OYE, E. & CHARLES, P. Contribution à l'étude de la fonction hépatique chez le noir africain. V. La glycémie. [**Contribution to the Study of Hepatic Function in the African. V. Blood Sugar**] *Ann. Soc. Belge de Méd. Trop.* 1952, Feb. 29, v. 32, No. 1, 85–90.

Glucose was determined in the total blood of 330 fasting adult Africans. The mean value, 98·3 mgm. per 100 cc., was in accord with the accepted figure for Europeans. As determined in 30 laboratory workers, the curve for hyperglycaemia induced by giving 50 gm. of glucose followed the normal course. The conclusion is drawn that the sugar metabolism of central Africans is normal.
J. H. Birkinshaw

MOOKERJEE, G. C. & GHOSE, B. K. **Haematological Response of Indian Troops to Moderate Anoxia in Extreme Cold Environment.** *Indian J. Med. Res.* 1951, Oct., v. 39, No. 4, 543–52.

VENOMS AND ANTIVENENES

DUTTA, N. K. & NARAYANAN, K. G. A. **Release of Histamine from Rat Diaphragm by Cobra Venom.** [Correspondence.] *Nature.* 1952, June 21, 1064–5, 1 graph.

BALOZET, L. Propriétés diastasiques des venins de scorpions. [**Diastase Properties of Scorpion Venoms**] *Arch. Inst. Pasteur d'Algérie.* 1952, Mar., v. 30, No. 1, 1–10, 1 fig. [12 refs.]

The following is a translation of the author's summary :—

The study of diastase properties capable of playing a part in poisoning by scorpion sting in French North Africa may be summarized as follows :—

1. Haemolysins (lecithinases). Present in the venom of *Scorpio maurus* (Scorpionidae). Absent from the venom of Buthidae : *Androctonus australis, A. amoreuxi, Buthus occitanus.*

2. Coagulant properties *in vitro.* None or almost none for the venoms studied. The venom of *A. australis* is the only one to show a very slight activity.

3. Anticoagulant properties *in vitro.* None for venoms of Buthidae. Present for venoms of *Sc. maurus.*

4. Proteolytic properties. None for all the venoms studied.

The venom of *Sc. maurus*, harmless for vertebrates, is the only one to exhibit diastase activities : it is haemolytic and anticoagulant *in vitro.*

H. J. O'D. Burke-Gaffney

DA SILVA, T. L. **The Scorpion Problem in Ribeirão Preto, São Paulo, Brazil. Notes on Epidemiology and Prophylaxis.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 508–13, 1 graph.

Ribeirão Preto is a city about 200 miles north-east of São Paulo, with a population of some 77,500 living in 15,500 buildings. Scorpions and stinging by them have increased of late years. Investigations were started in June, 1950. Four species were found : *Tityus serrulatus, T. bahiensis, Bothriurus bonariensis* and *B. magalhaensis,* the first-named greatly predominating. Of 10,085 captured in the 3 years 1949–51, 7,994 (79·2 per cent.) were *T. serrulatus* They were caught " mainly inside houses, in bathrooms, bedrooms, kitchens and also in rubbish heaps in the yards " and in piles of bricks. Many lived in spaces beneath the houses and entered the dwellings through cracks in the floors. In the 7 years 1945–51 inclusive, 1,331 persons were recorded as having been stung and 8 died, 7 of them children between 3 months and 7 years of age. STAHNKE has reported that in Arizona (population 750,000) there were on an average 3,000 scorpion accidents annually and 60 or more deaths. In Ribeirão Preto no significant differences were observed in race, age or sex of the victims ; 635 were males and 630 were females among 1,265 whose sex was known. More stingings occurred from August to November, or the start of the rainy season when the temperature is rising to summer heat. There may be a seasonal variation in toxicity of the venom, increase of potency occurring in the warm breeding season.

Ortho-BHC powder (Gammexane) and 30 per cent. DDT were used as insecticides. The former, used as 0·25 gm. per square metre, was the more satisfactory, driving the scorpions from their lurking places and killing them within 48 hours. Half this strength, 0·13 gm. per sq. metre, proved equally fatal, but death occurred after a longer interval. Interest was stirred by advertisements and by talks in schools and 40 collecting stations were established in pharmacies and more than 200 scorpions were brought in each week by those living near ; prizes were given to the students collecting most specimens. *H. Harold Scott*

DERMATOLOGY AND FUNGUS DISEASES

BELISARIO, J. C. **Parsnip Dermatitis in the Tropics under Active Service Conditions.** *Australian J. Dermat.* 1952, Apr., v. 1, No. 3, 183–93, 3 figs. [22 refs.]

MACKINNON, J. E. Los agentes de maduromicosis de los géneros *Monosporium*, *Allescheria*, *Cephalosporium*, y otros de dudosa identidad. [**The Agents of Maduromycosis of the Genera** *Monosporium*, *Allescheria*, *Cephalosporium* **and others of Uncertain Identity**] *An. Facul. de Med. Montevideo.* 1951, Apr., v. 36, No. 4, 153–80, 15 figs. on 2 pls. [51 refs.] English summary.

This is a detailed study of the morphological and physiological characters of a number of fungi isolated from the white grain type of mycetoma.

Eight strains of *Monosporium apiospermum* Saccardo, a not uncommon cause of mycetoma, and 2 of *Allescheria boydii* Shear, a rare cause of the disease, were included in the investigation. The author considers that *M. apiospermum* is not, as stated by EMMONS (*Mycologia*, 1944, v. 36, 188), an imperfect form of the ascomycete *A. boydii*, because the conidial reproduction in *A. boydii* is of the *Cephalosporium* type, a form never observed in *M. apiospermum* which bears its conidia singly or in groups of 2 or 3 on the tips or sides of conidiophores. Furthermore, the optimal temperature for vegetation of *M. apiospermum* lies between 30 and 37°C. but that of *A. boydii* is below 30°C.

The species *Acremoniella lutzi* Arêa Leão and Lobo and *Pseudoallescheria sheari* Negroni and Fischer were found to be identical with *M. apiospermum*, and a strain from mycetoma named by FONSECA and ARÊA LEÃO (*Sciencia Med.*, 1927, v. 5, 536) *Scedosporium apiospermum* and afterwards transferred to *Monosporium*, is, in fact, not *M. apiospermum* but a fungus of undetermined identity.

Strains of *Cephalosporium* isolated from mycetoma include at least two valid species, *Cephalosporium recifei* Arêa Leão and Lobo, and *C. falciformis* Carrion. The species *Cephalosporium granulomatis* WEIDMAN and KLIGMAN [this *Bulletin*, 1946, v. 43, 778] was found to be similar to *C. acremonium* and may have been merely a contaminant.

The probable relationship of any of the species, studied in culture, to *Indiella mansoni* and *Indiella reynieri*, as recognized in the parasitic form in lesions, has not been established. *J. T. Duncan*

MACKINNON, J. E. Características de cuatro cultivos de *Madurella mycetomi* (Laveran) Brumpt aislados en el Sudán y en la Somalía Británica. [**Characteristics of Four Cultures of** *Madurella mycetomi* **(Laveran) Brumpt isolated in the Sudan and in British Somaliland**] *An. Facul. de Med. Montevideo.* 1951, Apr., v. 36, No. 4, 197–210, 4 figs. [26 refs.] English summary.

In an earlier report on the nomenclature of *Madurella mycetomi* (LAVERAN 1902) BRUMPT 1905, Mackinnon *et al.* [this *Bulletin*, 1950, v. 47, 490] pointed out that the description of the species, based only on the character of the fungus as it was seen in the parasitic "grain", was inadequate and the combination *Madurella mycetomi* should be rejected as *nomen dubium*.

The present report deals with the study of 4 strains of fungi from black-grain mycetoma occurring in the Sudan and British Somaliland, which were determined, when freshly isolated, as *Madurella mycetomi* by J. T. DUNCAN on the basis of their morphology in culture and in the lesion. No description of these fungi had been published. Three of the strains, at the time of the present study, had been under artificial culture for more than 20 years and the fourth was a more recent isolate.

The four strains were compared, in respect of their morphological and physiological characters, with a strain of *Madurella americana* Gammel *et al.* 1926 and one of *Madurella ikedae* Gammel 1927. The 6 strains were found to be identical in all their significant characters, but they could be distinguished from *Madurella grisea* Mackinnon *et al.* 1949 [*loc. cit.*], a species isolated from black-grain mycetoma in South America.

The name *Madurella mycetomi* has been used extensively by French authors and others, and Mackinnon considers that the description of *Madurella mycetomi* should be completed and the species revalidated. A description of the species is appended, but not the Latin diagnosis.

Madurella americana Gammel *et al.* and *Madurella ikedae* Gammel pass to the synonymy of *Madurella mycetomi.* *J. T. Duncan*

Newcomer, V. D., Wright, E. T. & Tamblyn, E. Elizabeth. **The Embryonated Egg as a Culture Medium for the Animal Phase of** *Coccidioides immitis*. *J. Infect. Dis.* 1952, May–June, v. 90, No. 3, 258–66, 8 figs.

In view of published reports of success in obtaining rich cultures of *Coccidioides immitis* in its parasitic spherule form, by inoculating the fungus into the allantoic cavity or the yolk sac of the developing chick embryo, the present authors decided to investigate the usefulness of this method of culture.

Eight-day embryonated eggs were inoculated in the allantoic cavity or in the yolk sac with pus or tissue washings containing the parasitic spherules of *C. immitis*, or with suspensions of spores of the fungus from saprophytic culture. The results of these tests, as judged by the growth in plate cultures sown from the inoculated eggs after 8 days' incubation at 99·5°F., showed that the fungus survived in 50 per cent. of the eggs, whether the embryo remained alive or died. The numbers of colonies developing on the plates indicated a 4-fold to 4,000-fold increase of the fungus during the period of incubation of the eggs. This result would not justify the claim that the method is useful for obtaining a rich culture of the fungus.

When the results from embryonated and non-embryonated eggs were compared, it was evident that the living embryo exerted a mild inhibitory action on the development of the fungus.

Passage experiments with living, embryonated eggs, for the initial inoculation a suspension of the parasitic spherules from the omentum of an infected mouse being used, showed that the fungus could be propagated in this way for an indefinitely long time, by 8-day transfers. There was a slight increase in the amount of fungal growth with adaptation to the egg medium, but the culture was never rich. After 8 successive transfers on living eggs the fungus was found to have lost none of its pathogenicity for the mouse.

Microscopical examination of the embryo and the egg material showed that, regardless of the nature of the inoculum (parasitic spherule or saprophytic spore), the fungus vegetated only in the mycelial form ; nevertheless, the possibility of a very transient and unobserved production of parasitic spherules was admitted. The mycelial growth was found on the extra-embryonic membranes and in the yolk sac, but not in the embryo.

It would appear that the statements of other observers that enormous numbers of spherules of the parasitic stage of *C. immitis* could be found in 7-day cultures in the allantoic cavity or in the yolk sac are attributable to their mistaking normal egg-yolk spherules for the fungal bodies. As seen in wet preparations, the egg spherules, of which the yolk is largely composed, are thin-walled, cystic bodies which vary much in size, the larger forms exceeding the size of *C. immitis* spherules. When, however, pus containing the true parasitic spherules was mixed with the material from uninoculated eggs it was

found impossible to distinguish the fungal spherules from the others. In fixed smears and sections of egg yolk stained by haematoxylin and eosin, by Mallory's triple stain or even by the selective periodic-acid-Schiff method, it was still impossible to distinguish the parasitic spherules of *C. immitis* from the stained spherular bodies of normal egg yolk.

The authors' investigation has therefore failed to substantiate the observations reported by others. *J. T. Duncan*

Leite, A. S. & Ré, L. Aspectos do *Paracoccidioides braziliensis* e do *Paracoccidioides cerebriformis* em saprofitismo. [**Saprophytism in** *Paracoccidioides braziliensis* **and** *P. cerebriformis*] *Anais Inst. Med.Trop.* Lisbon. 1951, Mar., v. 8, No. 1, 27–32, 1 diagram. [10 refs.] English summary.

MISCELLANEOUS DISEASES

Soper, F. L. **The Elephant never forgets.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 361–8. [12 refs.]

The distinguished president of the American Academy of Tropical Medicine in this address emphasized that " as responsible public health workers, we must not be misled by the inactive status of certain diseases, no matter how long such apparent inactivity may persist, so long as the conditions suitable for their recurrence are permitted to continue ".

He referred to the spread of jungle yellow fever through the forested areas of Mexico, Central America, Panama and South America, thus forming a permanent potential source of virus for the reinfection of towns harbouring *Aëdes aegypti*. The very absence of true yellow fever militates against the completion of the task of *aegypti* eradication. As another example he mentioned the possibility of a strain of lice resistant to DDT being spread from Korea to other parts of the world by returning United Nations soldiers, thus renewing the risk of epidemic typhus.

There is a long way to go before we can say that the infectious diseases are really under control ; some are as yet untamable while many are, to quote Zinsser, " confinable in the zoological garden of controlled diseases ". [The title of Dr. Soper's paper is thus explained : " I have taken the long-memoried elephant as the symbol of the savage communicable diseases, whose activities are being more and more restricted but which have never lost their instinct and capacity for human destruction".] With the present-day armament of insecticides, antibiotic and chemotherapeutic substances, eradication is the goal of public health workers. *R. Ford Tredre*

Dornoy, J. M. La réaction de Maclagan dans quelques affections exotiques. [**Maclagan's Thymol Turbidity Test in some Tropical Diseases**] 84 pp. 1951. Lyons : Bosc Frères, 42, quai Gailleton.

After discussing the technique and mechanism of Maclagan's test, the author gives the results of 421 such tests carried out in 297 colonial repatriates suffering from a variety of tropical diseases.

The results largely confirm those of other workers and indicate that, while the test is in no way specific for them, it may be of value in the study of certain tropical conditions. Details are given of the results obtained in several cases of malaria, amoebiasis, leishmaniasis, trypanosomiasis, rickettsial diseases,

spirochaetoses, bacterial infections and helminthiasis. Tests were also made in a variety of general conditions, including "colonial liver", and chronic alcoholism.

The author's results suggest that in healthy Africans, the thymol test is the least upset of the tests commonly employed.

In certain conditions, *e.g.*, amoebiasis, rickettsial disease and helminthiasis, positive tests were rarely found, though the test appeared to have some value in the hepatic manifestations of schistosomiasis. It is suggested that it has a certain value in schistosomiasis, leptospirosis, leprosy, kala azar and trypanosomiasis.

The monograph gives considerable detail and contains over 130 references.

H. J. O'D. Burke-Gaffney

Reeder, W. H. & Goodrich, B. E. **Pulmonary Infiltration with Eosinophilia (PIE Syndrome).** *Ann. Intern. Med.* 1952, May, v. 36, No. 5, 1217–40, 3 charts & 14 figs. [83 refs.]

"1. Literature pertaining to Loeffler's syndrome, tropical eosinophilia and related conditions has been reviewed.

"2. Pulmonary infiltration with eosinophilia (PIE syndrome) may accompany allergic diseases of variable severity.

"3. Cases illustrating reversible, prolonged and fatal outcome are presented."

Rao, C. K. P. & Krishnan, P. **A Preliminary Trial of Aureomycin in the Treatment of Tropical Eosinophilia.** *Indian J. Med. Sci.* 1952, May, v. 6, No. 5, 302–5.

The authors, from Madras, encountered cases of tropical eosinophilia in which the use of arsenic was contra-indicated. They set out to try the effect of aureomycin "as there is a growing belief that tropical eosinophilia is due to a virus infection of the lungs".

Case notes are given of 5 patients who were given total doses of 6 to 7·25 gm. of aureomycin in 4 to 8 days; and of 4 others, given 6 injections of acetylarsan. The results of both treatments are tabulated.

Owing to the small numbers, and the difference in the time of the haematological review in the two series, no definite conclusion can be drawn. All those treated with aureomycin showed "definite clinical and some hematological evidence of amelioration" [but in 2 of the 5 the drug had to be stopped because of gastro-intestinal upsets]. None of these 5 could be considered cured, as the eosinophilia remained at 29, 68, 22, 16 and 35 per cent. respectively; in the case of those receiving arsenic these figures were 5, 9, 22 and 32 per cent. In the arsenic group, clinical signs persisted in 2 cases. The authors propose to continue their trials with aureomycin and to publish their results.

H. J. O'D. Burke-Gaffney

Carayon, A. & Dieng, J. Le cancer chez les races noires de Guinée Française. Considérations cliniques, anatomiques et chirurgicales à propos de 43 cas personnels. [**Cancer in Africans in French Guinea. Observations on 43 Cases**] *Méd. Trop.* Marseilles. 1952, Jan.–Feb., v. 12, No. 1, 66–72.

Between May 1943 and September 1946 the authors have met with 43 cases of cancer among African patients admitted to the surgical service of the Hôpital Ballay in French Guinea, 7 epitheliomas among Lebanese and 2 malignant

tumours (a glioblastoma and a sarcoma) among Europeans. Histological reports are available for 42 tumours, of which 18 were adeno-carcinomata, 14 were other types of epithelial carcinomata and 10 were sarcomata. The proportion of sarcoma to tumours of epithelial origin is 1 to 3, compared with 1 to 17 recorded in Switzerland, 1 to 30 in Holland and 1 to 40 in Germany, but the same finding has been recorded in other tropical countries. In the group of adeno-carcinomata the liver was the organ affected in 12 cases, the salivary glands in 2, the ovary in 2 and the thyroid and breast in 1 each. Of 3 columnar-cell carcinomata the rectum was the organ affected in one case, following a lymphogranulomatous stricture, and the intestine in two.

The frequency of primary carcinoma of the liver among Africans has been the subject of much discussion in recent literature ; figures quoted by the authors are those of BERGERET at Dakar (58 per cent. of all cancers seen) and those of CHABEUF in the Cameroons (19·4 per cent.). Of the authors' 12 patients, 9 were males aged 20–40 years, with the exception of one patient aged 52. All the patients had painful enlargement of the liver, fever and wasting, with multiple haemorrhages in one case and with intraperitoneal haemorrhage in another. Ascites was a late sign and pulmonary metastases were encountered in one case only. In 6 cases the disease was of the nodular type, in 4 of the cirrhotic type with adenocarcinoma and in 2 of the " massive " type. The last form occurring in patients with proved amoebic dysentery resembled amoebic hepatitis so closely that treatment for this condition was carried out, culminating in laparotomy, at which the true diagnosis was established.

Only 2 cases of malignant melanoma were seen, one in which the liver was invaded by a tumour of extra-hepatic origin and another in which there were diffuse melanomata in the peritoneal cavity. There were no tumours of nervous tissue or of the external genitals. Two of the 3 myxosarcomata affected the uterus. The 43 tumours occurred in 24 males and 18 females, the male preponderance being due to the higher proportion of males with primary cancer of the liver. Benign tumours were very frequent, but appeared not to be related in any way to the corresponding category of malignant tumours, nor did inflammatory conditions, keloids, cirrhosis or parasitic lesions play any important part in the aetiology in the authors' opinion. The only probable factor they could find in their 12 patients with cancer of the liver was that 11 of them belonged to tribes whose staple diet was rice and one subsisted mainly on millet, a substance rich in magnesium ; in all the cases there was evidence of avitaminosis.

Of the 43 tumours, 25 were inoperable and 18 were subjected to operation, laparotomy in 5 cases, excision in 13. *W. L. Harnett*

PROTOZOOLOGY : GENERAL

PELTONEN, T. **Toxoplasmosis. A Case of Family Infection.** *Ann. Med. Intern. Fenniae.* Helsinki. 1952, v. 41, No. 2, 127–33. [18 refs.]

" A case is described in which the father (or the mother) of a family was infected with toxoplasmosis outside the home. The infection may have been transferred to the other spouse in coitus. The youngest of four children had congenital toxoplasmosis, but the three elder children were healthy despite the fact that they lived with their infected parents and sister."

Brat, L. Zur Röntgendiagnose der Toxoplasmose. [**The X-Ray Diagnosis of Toxoplasmosis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 493–7, 1 fig.

The English summary appended to the paper is as follows :—

"Scattered calcium deposits in the brain are often interpreted as residua of toxoplasmosis. A detailed case report is given of a 45 years old comatose patient whose roentgenogram showed distinct calcifications of choroidal plexus. Autopsy revealed a glioma of right anterior lobe. As toxoplasma infection is clinically unimportant in adults diagnosticians are cautioned not to be led astray by roentgen findings suggesting toxoplasmosis."

Callot, J. & Puech, J. Toxoplasmose du rat blanc. [**Toxoplasmosis of the White Rat**] *Ann. Parasit. Humaine et Comparée.* 1952, v. 27, Nos. 1, 2 & 3, 51–5.

According to some previous workers, white rats are highly susceptible to experimental infection with *Toxoplasma*, which persists in their brain for at least 2 years. The present authors found that, on the contrary, white rats were only slightly susceptible and that the infection ran a transient course.

In their experiments, they used a human strain isolated in Holland, which killed mice inoculated intraperitoneally in 5 days. Adult rats inoculated by the same route with peritoneal exudate of infected mice showed no outward signs of infection to the end of their natural lives, while in those which were killed there were no macroscopic lesions or changes in the organs examined (lungs, liver, spleen and brain), but some ascitic fluid could be recovered from the peritoneal cavity up to 12 days after inoculations. A search for toxoplasms was made in preparations (fresh and stained) of the peritoneal exudate and of organ smears, as well as by subinoculation of mice with material from rats. The parasites could never be detected by direct examination of the preparations from rats, but they were found in mice inoculated with the peritoneal exudate of rats up to the 4th day of the infection, and in those inoculated with suspensions of rat liver and spleen between the 4th and 10th days. On the other hand, no parasites were ever found in mice inoculated with rat's blood or brain tissue.

The peritoneal exudate of infected mice was also inoculated into pregnant female rats, but it had no effect on the period of gestation or on the offspring, which were normal and free of parasites.

Further experiments were carried out on young rats inoculated from infected mice. A new-born animal showed toxoplasms in the peritoneal exudate between the 3rd and 6th days, while 3- to 6-day-old ones revealed parasites only up to the 3rd day. None of the young rats showed any pathological changes. Rat-to-rat transfers succeeded only up to the 5th passage.

In view of the conflicting results obtained by different authors, it is concluded that the susceptibility of rats to infection varies with the strain of *Toxoplasma* used. *C. A. Hoare*

Eyles, D. E. **Toxoplasma in the Norway Rat.** *J. Parasitology.* 1952, June, v. 38, No. 3, 226–9.

"Brain tissue suspensions from one hundred wild Norway rats caught in the City of Memphis, Tennessee were inoculated into laboratory mice and one strain of *Toxoplasma gondii* was recovered. Eighteen pools of five rat brains each, were inoculated into guinea pigs with five infections resulting. Taking the two series together, over three per cent of the Memphis rats tested carried *Toxoplasma* infections. Since the Norway rat is usually closely associated with man

it must be considered as a possible reservoir host, until the cycle of transmission is elucidated.

" Dye-tests performed with the sera of 100 rats gave positive results in 20 cases. No conclusions can be drawn as to the significance of this figure, except that the experimental results showed that rats with negative dye tests can give rise to infections in laboratory animals."

BAUER, F. *Toxoplasma gondii.* Untersuchungen über Widerstandsfähigkeit gegen physikalische und chemische Einflüsse. [**Study of the Resistance of *Toxoplasma gondii* to Physical and Chemical Agents**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 497–9.

The English summary appended to the paper is as follows :—

" Resistance of Toxoplasma gondii against heat, cold and disinfectants was tested in saline rinsings from the peritoneal cavity of toxoplasma-infected mice. It was found that toxoplasma cells do not survive when heated to 60 centigrades for 10 minutes or when left at 4 centigrades for 14 days. Boiling kills them immediately, also some modern disinfectants used in surgical routine (Cialit, Debacil), while formalin, alcohol, phenol and some more disinfectant chemicals in current dilution need 1 to 20 minutes to bring about destruction."

SCHMIDT-HOENSDORF & HOLZ, J. Infektionsversuche bei poikilothermen Tieren (*Rana esculenta* und *Natrix natrix*) mit *Toxoplasma gondii.* [**Study of the Possible Infection of Cold-Blooded Animals by *Toxoplasma gondii***] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 500–503.

The English summary appended to the paper is as follows :—

" Frogs (Rana esculenta) and ring-snakes (Natrix natrix) were artificially infected with massive and repeated doses of Toxoplasma gondii obtained from the peritoneal cavity of infected mice. Frogs and snakes were kept at temperatures ranging from 18 to 30 centigrades. There was no evidence that infection took place ; pathological changes were lacking in autopsies and all questionable tissues found free from toxoplasma. The conclusion is that cold-blooded animals of European climates do not act as hosts or transmitters of toxoplasmosis."

PUECH, J. Terramycine et toxoplasmose expérimentale du lapin. [**Terramycin and Experimental Toxoplasmosis in Rabbits**] *Ann. Parasit. Humaine et Comparée.* 1952, v. 27, No. 4, 419–20.

The author gave terramycin to 3 rabbits in the form of pills, known to be absorbed, in doses of 12, 25 and 100 mgm./kgm. according to weight, 10 to 24 hours before the animals were inoculated intradermally with 0·1 cc. of ascitic fluid from mice infected intraperitoneally with a human strain of *Toxoplasma* from Holland. The rabbits died in 8, 9 and 10 days, compared with 7–11 days in the case of controls. Pathological lesions developed in the rabbits and toxoplasms were found in smears at the time of autopsy : minced organs from the infected rabbits proved lethal to mice.

The rabbits were evidently not protected by terramycin in these conditions, in contrast to the findings of GIROUD and GAILLARD (*C.R. Acad. Sci.*, 1951, v. 232, 1457), who found that terramycin resulted in survival of rabbits infected with the strains of *Toxoplasma* used by them.

H. J. O'D. Burke-Gaffney

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

COLLIGNON, E. Sur l'acclimatement des gambouses en Algérie. [**Acclimatization of *Gambusia* in Algeria**] *Arch. Inst. Pasteur d'Algérie.* 1952, Mar., v. 30, No. 1, 57–9, 1 map.

The following is a translation of the author's summary :—

Gambusia holbrooki introduced into a mountain lake in Algeria and left without surveillance for twelve years have maintained themselves there and are still multiplying, while they continue to act as destroyers of Culicides.

H. J. O'D. Burke-Gaffney

PARKER, A. H. **The Effect of a Difference in Temperature and Humidity on certain Reactions of Female *Aëdes aegypti* (L.).** *Bull. Entom. Res.* 1952, Mar., v. 43, Pt. 1, 221–9, 1 fig.

" Sir Rickard Christophers [this *Bulletin*, 1948, v. 45, 40] working at 25°C. and a relative humidity of 80–90 per cent. found female *Aëdes aegypti* to be attracted by a warm dry surface at 40°C., and to be unaffected by a moist surface at room temperature. The writer [*ibid.*, 1949, v. 46, 408], working at 28°C. and 50–70 per cent. R.H. (usually near 50 per cent.) found the opposite : a warm dry surface at temperatures from 36°C. to 40°C. had no effect, while a moist surface at room temperature exerted a quite definite attraction. The purpose of the present experiments was to test the hypothesis that the difference between the results obtained in these two investigations was due to the difference in the ambient temperature and humidity.

" Repetition of the relevant experiments at 25°C., 85–90 per cent. R.H., and 28°C., 50–55 per cent. R.H., gave results indicating that temperature and humidity difference operating at the time of the experiment could account for part but not all of the discrepancy. There are indications that the remainder may have been a result of the conditioning effect of temperature and humidity differences operating on the insect prior to the experiment.

" The results emphasise the need for a full description of the climatic conditions under which behaviour work of the type discussed is performed."

i. DAKSHINAMURTY, S. & SHARMA, M. I. D. **The Humidity Preferences of Mosquitoes.** *Indian J. Malariology.* 1951, June, v. 5, No. 2, 209–19, 2 figs. [13 refs.]

ii. —— & ——. **The Temperature Preferences of Mosquitoes.** *Ibid.*, 221–7 1 fig. [12 refs.]

i. The responses of unfed, freshly-emerged females of *Anopheles stephensi* and of *Culex fatigans* were studied in a choice chamber consisting of a circular, covered, dish, in each half of which the humidity was controlled at a known value by sulphuric acid mixtures in small pots under the perforated platform on which the mosquitoes moved about [see this *Bulletin*, 1949, v. 46, 578]. The chamber was set up in a large closed box lighted from above by a " daylight-bulb " giving a light quality approximating to that of daylight. Ten mosquitoes were released in the chamber for each test and were viewed through an observation slide in the box at frequent intervals during a half-hour. In one series of experiments temperatures " above 30°C." and relative humidity

choices of 20–60, 40–60, 40–80, 60–80, and 80–100 per cent. were provided. In a further series, relative humidity choices of 20–60, 40–60, 60–80, and 80–100 per cent. were provided at temperatures "below 30°C.".

From tabular matter it is shown that temperatures "above 30°C." varied from 31°C. to 39°C.; "below 30°C." the range is from 24°C. to 28°C. The tests were repeated 9 to 14 times with 10 mosquitoes on each occasion. The temperature fluctuations during any one test (which lasted half an hour) are reported as being constant. But they differed from test to test on different days within the ranges given above.

Both *A. stephensi* and *C. fatigans* were mostly inactive at temperatures "below 30°C." or, if they were active, they showed no significant tendency to occur in one or other of the humidities offered in the different choices. An exception occurred with *A. stephensi* which showed some tendency to prefer 80 per cent. rather than the alternative of 100 per cent. relative humidity. At temperatures "above 30°C." both species showed a preference for the higher of two humidities except in the alternatives of 80–100 per cent. relative humidity when the lower humidity was most frequented.

In discussing these results it is suggested that the tendency of the mosquitoes to occur at the higher of two humidities, except when the higher is actually saturated air, may be explained by supposing that, in the first case, rapid desiccation is avoided and, in the second place (in the case of avoidance of saturated air) the relatively drier air would allow for loss of water vapour through the tracheal system, it being presumed that some loss in this way is necessary for the normal metabolic activity of the insects.

ii. The second paper deals with the reactions of the same species of mosquitoes when given the opportunity of frequenting an environment of either 20°C. or 25°C.; in a second series the alternative environments provided were at 25°C. and 30°C. The observations were made in the same day-light box, with the same circular glass chambers, the halves of which were kept at the desired temperatures by water jackets. Humidity is expressed as saturation deficiency in millimetres of mercury. The saturation deficiency at the lower range of temperature (20–25°C.) was 7 mm., and 9·5 mm. at the higher range (25–30°C.). These uniform saturation deficiencies for the whole chamber were obtained by placing pots of sulphuric acid mixtures under the platform of each half of the chamber, the mixtures being calculated for relative humidities which, at the temperatures under comparison, resulted in identical saturation deficiencies in each half of the chamber.

A. stephensi showed a significant tendency to frequent the environment at 25°C. rather than 20°C. or 30°C. This was also the case for *C. fatigans* when the choice offered was 25°C. and 30°C., but at 20–25°C., a preference was only apparent once and that was for 25°C. rather than 20°C. The mosquitoes showed a sharp avoiding reaction to the higher temperatures.

D. S. Bertram

MIYAZAKI, I. **On a New Anopheline Mosquito** *Anopheles yatsushiroensis* **n. sp. found in Kyushu, with some Remarks on Two Related Species of the Genus.** *Kyushu Mem. Med. Sci.* Fukuoka. 1951, Dec., v. 2, No. 3, 195–206, 6 text figs. & 15 figs. on 2 pls. [15 refs.]

PRATT, H. D. **Notes on** *Anopheles earlei* **and other American Species of the** *Anopheles maculipennis* **Complex.** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 484–93, 4 pls. [14 refs.]

ROZEBOOM, L. E. *Anopheles* **(A.)** *earlei* **Vargas, 1943, in Montana : Identity and Adaptation to Laboratory Conditions (Diptera : Culicidae).** *Amer. J. Trop. Med. & Hyg.* 1952, May, v. 1, No. 3, 477–83, 2 figs.

Levi-Castillo, R. Vorläufige Liste der Stechmücken (Uranotaeniini, Toxorhynchitini, Culicini, Aedini und Sabethini) aus Ecuador (Diptera-Culicidae). [**Provisional List of the Mosquitoes (Uranotaeniini, Toxorhynchitini, Culicini, Aëdini and Sabethini) of Ecuador**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 552–9. [10 refs.]

Christophers, S. R. **The Recorded Parasites of Mosquitoes.** *Riv. di Parassit.* Rome. 1952, Jan., v. 13, No. 1, 21–8. [97 refs.]

The author reviews the parasites recorded from mosquitoes. These include the fungi, *Entomophthora* and *Coelomomyces*, several protozoan species, representing all the main divisions of the phylum, species of *Rickettsia* and *Spirochaeta*, and intermediate stages in the life-history of the trematode *Agamodistomum*, and the nematode *Agamomermis*. Ectoparasites which are recorded are larvae of mites (Hydrachnidae), and the midge, *Culicoides anophelis*. Brief remarks on the life-history, as far as it is known, are given for each parasite mentioned. *A. J. P. Goodchild*

Wirth, W. W. **Two New Species of Anthropophilic *Culicoides* from Guatemala (Diptera : Heleidae).** *J. Parasitology.* 1952, June, v. 38, No. 3, 245–7, 1 fig

Saccà, G. Due mosche nuove per la fauna d'Europa : *Musca sorbens* Wied. e *Limnophora tonitrui* Wied., in Sicilia (*Diptera, Muscidae*). [**Two New Records of Muscids in Europe : *Musca sorbens* and *Limnophora tonitrui* in Sicily**] *Riv. di Parassit.* Rome. 1952, Apr., v. 13, No. 2, 177–80, 1 fig. English summary.

DeLong, D. M., Boush, G. M. & Lea, A. O. **The Comparative Residual Toxicity of Fog Applications of certain Organic Insecticides to House Flies.** *J. Econom. Entom.* 1952, Apr., v. 45, No. 2, 323–5.

Tests are described comparing the effectiveness to house-flies of fog applications of some of the newly developed organic insecticides. The tests were conducted both in individual test rooms, kept under controlled conditions, and in University dormitory buildings and school rooms as two types of commercial building, which were kept in normal use throughout the tests. The insecticides were dispersed into the rooms by means of a generator which breaks the liquid into droplets of 10–20 micron particle size. The quantities used were sufficient to give a deposit of 5·6–7·0 mgm. per sq. ft. of surface. Weight tests with " Cellophane " sheets, 6 sq. ft. in size placed on different parts of the surface, showed that the application was equally dispersed. One hundred 4-day-old house-flies were liberated at intervals of up to 100 days after treatment, and mortality counts were made 36 hours after liberation.

The results show that lindane and chlordane are more effective in controlling house-flies than dilan, methoxychlor or DDT : 3 per cent. chlordane and 2 per cent. lindane were nearly as effective as 7 per cent. chlordane up to 60 days after treatment, after which time lindane lost its effectiveness more quickly. DDT, 5 per cent., gave only 44 per cent. mortality 26 days after treatment.

The high toxicity of the first two is attributed to their volatility, the effects of which were tested by placing cages containing twelve 4-day-old female flies at different distances from the walls and ceiling of treated rooms. Chlordane proved to be the most toxic, 100 per cent. mortality being obtained after 48 hours' exposure 1 foot away from a wall 110 days after treatment. Lindane was second in toxicity, 100 per cent. mortality being obtained within 16 hours' exposure 1 foot away from a wall treated 8 days previously with 2 per cent.

lindane. DDT was inferior to these two, 7 per cent. giving 48 per cent. mortality in 24 hours, and 3·5 per cent. being little better than the control.

Practical treatments on more than 300 large commercial buildings show that flies can be effectively controlled for periods of 4 weeks to 3 months by this method, depending on the type of surface, uniformity of coverage, and the accumulation of foreign matter. *Ruth Nash*

Babers, F. H. & Pratt, J. J., Jr. **Studies on the Resistance of Insects to Insecticides. I. Cholinesterase in House Flies (*Musca domestica* L.) resistant to DDT.** *Physiol. Zool.* Chicago. 1950, v. 23, No. 1, 58–63, 2 graphs. [28 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, May, v. 40, Pt. 5, 75.]

The following is based on the authors' summary. The cholinesterase activity in the heads of house-flies (*Musca domestica* L.) of a strain resistant to DDT was lower during the first five days after emergence than that in normal house-flies. On a weight basis, males in both resistant and normal colonies showed more cholinesterase activity than females. The activity varied from day to day, but no regular pattern was observed. Acetylcholine was hydrolysed about twice as fast as acetyl-β-methylcholine and about seven times as fast as benzoylcholine. The reaction was inhibited by excess substrate, and the optimum pH for the enzyme was about 5·75. Little change in rate was noted between pH 6·25 and pH 9·0.

d'Alessandro, G., Mariani, M. & Gagliani, M. Ancora sulla resistenza della *Musca domestica* al DDT e ad altri insetticidi clorurati. Selezione di ceppi forniti di caratteristiche differenti da unica popolazione catturata in natura. [**Resistance of *Musca domestica* to DDT and other Chlorinated Insecticides : Selection of Strains having Different Characteristics from a Single Population Captured in Nature**] *Riv. di Parassit.* Rome. 1952, Apr., v. 13, No. 2, 169–75, 3 graphs.

The English summary appended to the paper is as follows :—

" The authors have collected a mixed population of *Musca domestica* composed of individuals which were : normal, resistant to Chlordane, and resistant to DDT. From this population two strains were selected, which were characterized by a high degree of cross resistance to both insecticides. The authors have, moreover, shown that the resistance of these two strains extends also to other chlorinated insecticides."

la Face, Lidia. Sul comportamento ereditario della resistenza ad alcuni insetticidi in *Musca domestica*. [**Hereditary Factors in Resistance of *Musca domestica* to Insecticides**] *Riv. di Parassit.* Rome. 1952, Jan., v. 13, No. 1, 57–60. English summary.

This paper describes work on two strains of house-flies, one of which was resistant to DDT and the other to chlordane. Successive generations of flies of each strain showed great variability in the degree of resistance after selection with the appropriate insecticide over many generations. These fluctuations may be due to the fact that males and females were not separated before selection took place.

Flies resistant to DDT or to chlordane which were crossed with flies which were susceptible to these insecticides gave susceptible progeny, but there was no evidence of simple Mendelian inheritance in successive generations.

Inbreeding, by brother-sister matings, with the progeny of a pair of flies resistant to chlordane, did not lead to genetical homogeneity for resistance to this insecticide. It is suggested that resistance is controlled by many factors which combine and interfere in various ways. *C. Mary Harrison*

HARTZELL, A. **Effectiveness of *N*-(2-ethylhexyl) bicyclo [2.2.1]-5-heptene-2,3-dicarboximide on Houseflies.** *Contrib. Boyce Thompson Inst.* Menasha, Wis. 1949, v. 15, No. 7, 337–9.

HEISCH, R. B. & GUGGISBERG, C. A. W. **A Description of *Ornithodoros erraticus* (Lucas) from Kenya.** *Ann. Trop. Med. & Parasit.* 1952, May, v. 46, No. 1, 1–6, 13 figs.

PAVLOV, P. & GEORGIEV, B. [Recherches sur les ixodicides HCH, DDT, Gesarol et Dedetex puder. Ie communication] [**Study of the Ixodicides, BHC, DDT, Gesarol and Dedetex**] *Rev. Inst. Rech. Sci.* Sofia. 1950, v. 18, Pt. 1, 107–18. [20 refs.] [In Bulgarian.] Russian & French summaries.

WANSON, M. Présence de larves de Thrombididés sur les rongeurs du Congo Belge. [**Trombiculid Larvae on Rodents in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1952, Feb. 29, v. 32, No. 1, 101–7. [19 refs.]

Larval trombiculid mites were first recorded from Central Africa in 1950 [this *Bulletin*, 1951, v. 48, 680]. This material, collected from deep inside the ears of rodents of several species, has yielded 3 new species of *Trombicula* : *T. le gaci*, *T. sicei*, and *T. giroudi*, a new species of *Schöngastia* ; *S. oubanguiana*, and a new species of *Schöngastiella* ; *S. caeca*. First discovered in French Equatorial Africa, these species have now been found in the Belgian Congo. The *Trombicula* species occur in large numbers on their rodent hosts, but the other two species are not common, and are found in small numbers, about a dozen on each animal. These mite larvae live in the deep recesses of the ear, and are best revealed by cutting away the pinna down to the bony auditory orifice. In that situation, they are out of reach of the scratching activity of the animal. On man, these mites cause much irritation and even febrile symptoms, but are not able to remain for long before they are rubbed or scratched off. Larval trombiculid mites are most common during the rainy season ; during the dry season they disappear from the rodents and are replaced by larvae and nymphs of various ticks. Severe epidemics of a typhus-like rickettsiosis coincide with the appearance of mite larvae on the local rodent fauna, though the connexion between the two events is not yet fully investigated. *A. J. P. Goodchild*

FAIN, A. L'acariase pulmonaire au Congo Belge. [**Pulmonary Acariasis in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1952, Feb. 29, v. 32, No. 1, 41–7. [11 refs.]

Pulmonary acariasis, known for a long time as a disease of animals, has in recent years been recorded in human beings [this *Bulletin*, 1951, v. 48, 762]. Caused by several different species of saprophytic mites, its pathological manifestations are a chronic bronchitis and eosinophilia. Human pulmonary acariasis has not yet been found in the Belgian Congo, although further research seems indicated into those cases of bronchitis and tropical eosinophilia of which the cause is not obvious. As regards pulmonary acariasis in mammals, the author draws attention to the disease in monkeys caused by *Pneumonyssus* spp. A list is given of the species described from primates, with brief descriptions of

the lesions produced. In this list are included two new species, the descriptions of which are not yet published. They are from the monkey *Colobus badius powelli*, and the hyrax *Dendrohyrax arboreus adolfi-friederici*, the latter record being the first time mites of this genus have been found other than in primates.

A. J. P. Goodchild

Traub, R., Wisseman, C. L., Jr. & Audy, J. R. **Preliminary Observations on a Repellent for Terrestrial Leeches.** [Correspondence.] *Nature*. 1952, Apr. 19, 667–8.

The new standard issue in the U.S. Army for the impregnation of clothing against mites, mosquitoes, and fleas is M–1960. It consists of equal parts of N-butyl acetanilide, 2-butyl-2 ethyl-1,3 propanediol, and benzyl benzoate, with 10 per cent. of " Tween 80 " as an emulsifying agent. One gallon is sufficient to treat 28 uniforms.

This note reports on its value as a repellent against leeches—an action which was not foreseen. The observations were made in North Borneo where the leech *Haemadipsa zeylanica* occurs in substantial numbers and is associated here, as elsewhere in South-East Asia, with excessive loss of blood from leech-bite wounds, and sequelae such as secondary ulceration and cellulitis.

It was noticed that service personnel wearing uniforms impregnated with M-1960 were free of leeches although aboriginals, the Dusuns, and native porters not so clothed were seriously troubled by them. Several tests were made at once. A Dusun, for example, walked about 15 minutes in leech-infested vegetation wearing a treated sock and trouser leg on one leg, and an untreated sock and trouser leg on the other leg. No leeches were found on the leg covered by the treated garments while 18 leeches adhered to the other leg. Several other tests of this nature justified the conclusion that the effectiveness of M–1960 should be investigated further in more extensive field tests.

M-1960 retained its effectiveness against leeches on clothing washed 4 or 5 times in soapy cold water or subject to natural wetting by heavy rains ; it did not cause irritation of the skin or other toxic manifestations as occurred with DMP, which was found fairly effective against leeches, during the recent war.

D. S. Bertram

Trans. Roy. Soc. Trop. Med. & Hyg. 1952, May, v. 46, No. 3, 213–74. **Symposium on Insecticides** (arranged by P. A. Buxton). **I. The Place of Insecticides in Tropical Medicine : an Introduction** [Buxton, P. A.], 216–26 (59 refs.). **II. The Objectives of Residual Insecticide Campaigns** [Macdonald, G.], 227–34, 1 fig., (13 refs.). **III. Some Physical Factors affecting the Efficiency of Insecticides** [Hadaway, A. B. & Barlow, F.], 236–42 (35 refs.). **IV. The Newer Insecticides in relation to Pests of Medical Importance** [Busvine, J. R.], 245–52 (51 refs.). **V. The Resistance of Insects to Insecticides** [Harrison, C. Mary], 255–61 (33 refs.). **VI. The Action of some Synthetic Insecticides on Mammals** [Barnes, J. M.], 264–9 (30 refs.). **VII. A Plea for the Standardization of Experimental Work on Residual Insecticides** [Muirhead-Thomson, R. C., Gordon, R. M. & Davey, T. H.], 271–3.

This series of papers was arranged by Buxton to present an integrated picture of the qualities of insecticides as public health weapons, generally reviewing past knowledge while emphasizing the more recent. Buxton opened the meeting with an informal address ; his main contribution consists of a review of the literature, which is deliberately exclusive in that it attempts a careful selection of the most important sources of information. The text

deals with the main summarizing statements in the literature, and is followed by a classified statement under the names of successive arthropods showing the techniques used in their control, the results obtained and the authors of recent papers describing them. The arthropods listed are:— *Pediculus*, adults and larvae ; *Xenopsylla cheopis* and other fleas ; *Pulex* ; *Cimex* ; *Triatoma infestans* ; *Anopheles* adults ; *Anopheles* larvae ; Culicine adults ; *Phlebotomus* adult ; *Simulium* adult and larva ; *Culicoides* adult and larva ; *Glossina* adult ; *Musca domestica* adult and early stages ; *Trombicula* ; *Sarcoptes* and *Ornithodorus*. It concludes with 59 references which between them describe most of the important recent work on this subject.

Macdonald enquires by mathematical means into the degree of mortality which it is necessary to inflict on anophelines to secure the termination of the transmission of malaria. The factors involved include the duration of the extrinsic cycle of the parasite and the frequency with which the anopheline concerned bites man as important variables ; the density of mosquitoes and the recovery rate from malaria as less important ones. They are brought together in the form of a nomogram from which the minimum effective mortality can be derived. It is said to vary between about 15 and 32·5 per cent. per day, chiefly with the two main variables mentioned above. A statement on the objectives of anopheline eradication programmes is put forward in similar but less elaborated terms. In discussion Covell drew attention to variations in the man-biting habit, and the author replied that his intention was to show the relative importance of factors rather than their actual numerical values.

Hadaway and Barlow present a documented account of the effect of physical factors on the efficiency of destruction of aquatic larvae and on the qualities of aerosols, sprays and residual deposits. The first is briefly handled, being familiar. A formula is given for the relation between particle size and wind speed as it affects deposition of droplets on insects. A size of 10 to 20 microns is most effective at normal wind speeds, and if forest canopy must be penetrated a size exceeding 100 microns is useless because such particles adhere to the top cover. Residual deposits are discussed separately as oil solutions, emulsions, and wettable powders. The subjects of crystallization, " wet " and " dry " deposits, absorption, and blooming are all covered, but the main interest lies in the statement of the importance of crystal size and " sorption " and of fumigant effect. The paper includes a note of new work which shows that *Anopheles stephensi* is irritated equally by contact with DDT and BHC, but not by the fumigant action of the latter. The greater toxicity of BHC often masks its irritant effect, killing the mosquito before it can escape. In discussion Davidson reported some field observations on DDT, BHC and Dieldrin which showed more prolonged efficiency than might have been expected, and in which the effect of air-borne particles was important.

Busvine gives classified information on DDT, DDD, Methoxychlor, Toxaphene, BHC, Chlordane, Aldrin, Dieldrin, Parathion and Allethrin. Published data are brought together showing potency in relation to that of DDT against *Musca, Aëdes, Cimex, Ornithodorus, Pediculus* and *Anopheles*. A trend, though not a uniform one, is obvious throughout this table ; Dieldrin has a high coefficient against all groups, Chlordane and BHC are relatively less effective against *Anopheles* and more effective against *Musca*, while DDD shows the reverse tendency. The toxicity of these insecticides to mammals is presented as the median lethal dose for rats ; Parathion is toxic (MLD 3 to 10 mgm. /kgm.), Aldrin and Dieldrin are relatively toxic (MLD 45 to 55 mgm. /kgm.), and at the other end of the scale DDD, Methoxychlor and Piperonyl butoxide least so (MLD respectively 2,500, 6,000 and 7,500 mgm. /kgm.). The qualities of the main groups into which these substances fall are discussed. Opinions on relative value are freely given, and it is notable that the author considers that

Dieldrin should be excellent as a residual film insecticide because it combines the persistence of DDT with the insecticidal power of BHC.

Although there are great differences in the chemical constitution of these insecticides, their classification as " chlorinated hydrocarbons " seems justified as they all liberate HCl under alkaline conditions, and have similar power of stimulating the development of resistance. In discussion ALBERT mildly criticized this classification, thinking that the liberation of HCl was of no significance ; the discovery of the action of dianisylineopentane which does not liberate HCl suggests an effect due to spatial configuration of the molecule. COYNE considered that the lack of evidence of resistance to insecticides other than the chlorinated hydrocarbons was due to their restricted use, and BERTRAM pleaded for a continued study of ovicidal properties [see below].

Harrison reviews knowledge of insect resistance, which had first been noted against hydrogen cyanide and arsenicals, but which has come into prominence in connexion with the chlorinated hydrocarbons and is particularly evident in the house-fly. Two distinct types are involved ; in both the fly is susceptible to DDT applied in oil to the thorax ; in one flies walking on dry deposits are temporarily paralysed but do not die ; in the other such flies are not even temporarily paralysed. Both types may be inherited, but it seems that the genetic inheritance is different. The mechanism of their creation is obscure ; it is not due to exposure to sublethal doses, but apparently by a selection of slightly resistant individuals whose inter-breeding enhances the characteristic. Resistance varies greatly in degree and in specificity to different insecticides, no general rule covering all cases. Knowledge of the mechanism involved is described, metabolic processes which break DDT down apparently sometimes playing a part but not entirely accounting for it.

There is no clear case of resistance among anophelines. Acquired resistance, minor in degree compared with that of the house-fly, has been found in *Culex pipiens autogenicus* and two species of *Aëdes*, in a third species of which a minor degree of resistance has been encountered in the larva. It has not been possible to select resistant strains of *Pediculus humanus corporis* by experimental work but resistance has been reported in specimens in Korea, where head lice are normally susceptible. There is one record of the bed bug being resistant.

The outlook is uncertain, but no hope is to be expected from ringing the changes on present insecticides.

In discussion BRACEY drew attention to the properties of films of urea formaldehyde resins holding insecticides in solid solution, particularly to the residual qualities of pyrethrum incorporated in this way. He also thought that aqueous preparations of pyrethrum or allethrin might be preferable to oily ones for aerosol dispersion, being effective against DDT-resistant flies. Dr. Harrison, in replying, doubted the validity of the evidence for the superiority of pyrethrum over DDT.

Barnes reviews the mammalian toxicology of DDT, BHC, and the Dies-Alder Condensation products : Chlordane, Aldrin and Dieldrin. All act as acute convulsant poisons and produce visible changes in the liver and sometimes other tissues. The mechanism of poisoning is insufficiently understood ; it seems to be a direct action and may be through disturbance of the metabolism of nervous tissue. Poisoning by the Dies-Alder products is first marked by a striking loss of appetite which is countered by phenobarbitone. The average single lethal dose of Dieldrin to rabbits is 50 mgm./kgm., one-fifth that of DDT, but it has been noted that cutaneous application of slightly smaller amounts in solution may lead to death. The speaker concludes that research into toxicity must make more use of biochemical techniques than in the past, histological techniques having proven inadequate. In discussion LOURIE asked if barbiturates protected insects as well as man, but no evidence is available.

Chesterman emphasized the toxicity of BHC used medicinally for the treatment of oxyuriasis, he having found that 100 mgm. thrice daily for two days produced convulsions in an adult. Albert drew attention to some relevant selective action of insecticides on the growth of yeasts.

Muirhead-Thomson, Gordon and Davey drew attention to the conflicting nature of much of the evidence on the utility of insecticides which is derived from field experiments, into which many variables enter. Work should be concentrated on a couple of substances, perhaps DDT and BHC, and carried out under strictly controlled laboratory conditions, with a limited number of species of insects, being repeated in the field after consistent results had been achieved by such methods. WHO might accept responsibility for the design and correlation of the laboratory trials. They conclude with a list of 31 variables known to influence experimental results. In discussion Busvine stressed the value of field experiments, but agreed that laboratory work should be more carefully standardized, and in answer to Lourie gave some information on the standardization of insecticides. Replying, Davey said that the authors did not wish to substitute laboratory for field work, but to standardize the former.

[The symposium is of great value ; the Society and Professor Buxton have done a major service in bringing it together. It covers a very large part of the field of the medical aspects of the use of insecticides and is particularly carefully documented, so serving as a guide to the vast literature.] *G. Macdonald*

Bertram, D. S., Roberts, E. W. & Edwards, H. **A Rapid Method of sampling for *Damalinia* (*Bovicola*) *bovis* L. on Cattle, and its Use in a Comparison of the Effectiveness of 'Gammexane' and DDT against this Parasite.** *Ann. Trop. Med. & Parasit.* 1952, May, v. 46, No. 1, 7–24. [14 refs.]

The interest of this paper to readers of this *Bulletin* lies in its observations relating to the ovicidal action of BHC ("Gammexane") in cattle lice : the possibilities in relation to insecticides generally were referred to by Bertram [see above, (1952) p. 1006]. *H. J. O'D. Burke-Gaffney*

van Tiel, N. **On "Supona", a New Type of DDT Suspension.** *Bull. Entom. Res.* 1952, Mar., v. 43, Pt. 1, 187–202, 6 figs. [12 refs.]

Two DDT suspensions of a new type are described, "Supona"-D and "Supona"-DB. In the concentrated forms these thin creamy pastes contain 50 per cent. DDT and 39 per cent. DDT+13 per cent. technical BHC respectively, the active material being suspended in a complex colloidal oil-water system. The oil being a poor DDT or BHC solvent, the insecticidal substances are practically all in suspension. On dilution the suspension obtained is more stable than those of current dispersible powders and has a particle size $<25\ \mu$.

Laboratory and field experiments were carried out with "Supona"-D and a DDT emulsion containing about 30 per cent. DDT dissolved in a mineral oil phase for the control of *Glossina palpalis*. Both products were used in dilutions containing 5 per cent. DDT. Laboratory experiments with leaves of *Camellia thea* and *Begonia* sp. showed that the initial toxicity and stability in tropical sunlight of residues of "Supona"-D were somewhat less than those of the DDT emulsion. The resistance to rain, however, was better with residues of "Supona"-D. This was reflected in field experiments on 2 islands when residues of "Supona"-D had a more lasting effect on vegetation than those of the DDT emulsion used. Two islands on Lake Victoria were given 4 applications

of spray at fortnightly intervals, one with " Supona "-D, the other with the DDT emulsion. Only those parts of the vegetation normally inhabited by tsetse flies were treated, this comprising some 5–10 per cent. of the total area. The DDT emulsion gave a reduction of tsetse population to 22 per cent. of original value and maintained it for 17 weeks ; however, by 35 weeks after the last treatment the fly population was at the original density. " Supona "-D gave a reduction to 3 per cent. and the population remained low for 36 weeks, then an increase set in giving 39 per cent. of original population at 51 weeks after the last treatment.

The suspensions were tested as residual sprays against mosquitoes in huts. Laboratory experiments showed that the DDT content in diluted " Supona "-D could be reduced from 5 to 4 per cent., and yet give the same residual toxicity as 5 per cent. DDT dispersible powder. At Mpala, Uganda, 3 wooden and 3 mud experimental huts were used to compare residual properties of " Supona "-D with a DDT dispersible powder. The results over a 6-month period showed that " Supona "-D was on the whole more effective than the DDT dispersible powder. The DDT dispersible powder, however, was 100 per cent. effective for at least 4 months after treatment against both *Anopheles gambiae* and *A. funestus*. The author points out that this did not confirm the view of MUIRHEAD-THOMSON [this *Bulletin*, 1948, v. 45, 405 ; 1949, v. 46, 439] that DDT residues are insufficiently effective against *A. gambiae*. A larger-scale experiment was carried out in the Kisubi mission area, near Kampala, on 30 African huts with the use of " Supona "-DB, " Supona "-D and a DDT dispersible powder. After treatment the number of live mosquitoes per hut dropped to 1–2 per cent. of the original value. Catches over 29 weeks showed no significant difference in persistency of " Supona "-D and DDT dispersible powder. The best results, however, were obtained with " Supona "-DB in which the recovery was only 8 per cent. 29 weeks after treatment. *Thomas E. Fletcher*

BERCK, B. & SMALLMAN, B. N. **Absorption and Efflorescence of DDT deposited on Wood.** *Soap.* New York. 1952, Apr., v. 28, No. 4, 131–3.

In this paper direct chemical measurements were made of changes in the amount of surface available DDT that may be attributed to absorption and efflorescence of DDT deposited on wood. Fir plywood and glass panels were sprayed with 5 per cent. DDT in oil solution, water suspension and oil emulsion at approximately 125 mgm. per sq. ft. The wood surfaces were stripped with benzene at 1 or 45 days after application and the DDT estimated by the Schecter Haller colorimetric method. The initial deposit was obtained by stripping the glass plates after 1 day.

Recoveries at 1 day showed losses of 48, 41, and 33 per cent. of applied DDT for solution, suspension and emulsion respectively. The losses for the solution and emulsion were attributed to absorption by the wood. The loss in the case of the suspension was considered by the authors as an artefact resulting from incomplete recovery of DDT by the benzene ; this being due, they suggest, to the wood and inert material in the suspension still retaining enough oil after 1 day to prevent the benzene reaching all the DDT. [The authors did not verify this by using a water-miscible extractive such as acetone.]

Recoveries at 45 days showed consistent increases over 1 day recoveries by 23, 38 and 20 per cent. for solution, suspension and emulsion respectively. The increased recoveries for the solution and emulsion were attributed to efflorescence, *i.e.*, the transfer and deposition of absorbed DDT from a super-saturated solution to the surface. In the case of the suspension this was not suggested to be the case but the result was considered to be due to a complete extraction of DDT now the water had evaporated.

Forty-five days after application 80 per cent. of DDT applied in the emulsion and suspension and 64 per cent. for the oil solution was recovered from the wood surface. These results showing changes in quantity of surface-available DDT resulting from initial absorption and subsequent efflorescence, the authors suggest, may account for the change in toxicity from an initial low to a subsequent high value observed by other workers. *Thomas E. Fletcher*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

CAMERON, I. G. **Estate Medical and Health Practice in Malaya.** *East African Med. J.* 1952, Apr., v. 29, No. 4, 153–8.

In the era before World War II an admirable health system had been built up to care for the imported Indian labourers working on the rubber estates and tin mines of British Malaya. In this the management was advised principally by the estate medical practitioner with general surveillance by the Government Health Officer and Labour Controller. Most of the largest estates built small hospitals staffed by locally trained assistant surgeons and dressers competent to carry out microscopical examinations of blood and excreta. A log-book was kept of the medical histories of the entire labour force and their families, in which was recorded the findings of the routine clinical examination carried out every 3 months by the visiting doctor, together with the results of a simultaneous blood film examination and haemoglobin estimation. Children and pregnant women were examined monthly. Where indicated, treatment was given, and an examination made for intestinal parasites as well. Medical advice was given and taken on all aspects of health, such as the siting of new coolie-lines and their construction, the provision of concrete surface drains, water supplies, and latrines, for which the bore-hole type was favoured wherever possible at the rate of 1 seat per 10 of the total population. Instruction was given by the dressers on the prevention of helminthic infections. Malaria control was done by canalization of surface water and weekly oiling over an area of not less than half a mile radius from the coolie-lines. Special watch was kept when fresh jungle was being opened up and suppressive quinine given out for a few weeks if thought necessary. Other matters specifically mentioned as being closely supervised were the control of fly breeding and the fortification of the labourers' diets with red palm-oil.

Organization of the doctors' visits, usually twice a month to each estate, was complicated, but amply repaid by the low sickness rates and a 95 per cent. turn-out for work. *C. C. Draper*

BOOK REVIEW

WARDLE, Robert A. & MCLEOD, James Archie. **The Zoology of Tapeworms.** pp. xxiv+780, frontispiece & 419 figs. 1952. Minneapolis : Minnesota University Press. London : Geoffrey Cumberlege, Oxford University Press, Amen House, Warwick Square, E.C.4. [80s.]

It is not possible, in the brief space available, to discuss in detail this remarkable book. It describes, to use the words of the authors themselves, " the tapeworms of the world. It attempts to summarize what is known about their

classification, structure, life histories, and ways of life. It discusses the probable origin of tapeworms from free-living worms and the lines along which they may have diverged from one another. It provides descriptions of and identification keys for all the known families and genera of tapeworms and the majority of the known species."

This is, the reader will find, a modest description of the book. It gives only the bare bones, so to speak, of a work that should be in every library concerned with parasitic animals. We have, in English, no comparable account of the tapeworms and it is doubtful if there is, in any language, a book about them that gives, in one volume, so much detailed and up-to-date information.

The book is arranged in two parts. Part 1 deals with the general features, life history, biology, origin and evolution of tapeworms and also with their history and classification. For some readers this will be the most interesting section of the book, for it shows us the tapeworm in its historical and evolutionary perspectives and we see it as a citizen of the world, a living creature related to both man and other animals. Whatever we think of the views expressed, or of the new terms introduced, we find here a fresh and lively story that is well told. The chapter on the physiology of the tapeworms is especially valuable. It brings together a great deal of information that is scattered among the abundant references given. From it we get a glimpse of the physiological parasitology of the years to come, a new science which will transform the principles of control and treatment of the diseases caused by parasites of every kind.

Part 2 of the book discusses the individual species in greater detail. In it a much greater mass of material is collated. Six new Orders of tapeworms are created and some old friends appear under new names. The zoologist and systematist will find this part of the book invaluable.

The authors have wisely decided to illustrate the book with line drawings only. There are 419 of these drawings and all of them are very well done. The only photograph is the frontispiece portrait of Dr. DOLLFUS, to whom the book is dedicated. The bibliography, which covers 104 of the book's 780 pages, is very valuable and for this alone the book is worth buying. A pleasing feature of the book is the fact that, in spite of its bulk, it is not inconveniently heavy. Further, it opens flat at every page—a triumph of binding for which every reader will be grateful.

G. Lapage

Printed in Great Britain under the authority of HER MAJESTY'S STATIONERY OFFICE
by The South Essex Recorders, Ltd., Ilford.
(813) Wt. P7/401 11/52 S.E.R. Ltd. **Gp. 432**

ALPHABETICAL LIST OF AUTHORS OR SOURCES

d'Alessandro, G., Mariani, M. & Gagliani, M., 1004.
de Almeida, L. V., (973).
Anderson, H. H., Contopoulos, A. N. & Anderson, J. Van D., 952.
Ansari, M. A. R., (957).
Arch. Inst. Pasteur d'Algérie, (924).
Asenjo, C. F., 989.

Babers, F. H. & Pratt, J. J., Jr., 1004.
Backhouse, T. C. & Bearup, A. J., 977.
Balozet, L., 993.
Baltazard, M., with Bahmanyar, M., Pournaki, R. & Mofidi, C., 957.
Barnard, C. C., 959.
Barnes, J. M., 1006.
Bauer, F., 1000.
Belisario, J. C., (994).
Berck, B. & Smallman, B. N., 1010.
Bertazzi, C. G., 958.
Bertram, D. S., Roberts, E. W. & Edwards, H., 1009.
Bervoets, W. P. & Damm, A., 948.
Bijlmer, J., 959.
Black, R. H., 932.
Blumberg, B., McGiff, J. & Guicherit, I., 979.
Born, W. C., 927.
Brand, P. W., (969).
Brat, L., 999.
Breuil, M., 956.
Brock, J. F. & Autret, M., 988.
Brown, R., 962.
Busvine, J. R., 1006.
Buxton, P. A., 1006.

Callot, J. & Puech, J., 999.
Calvó Fonseca, R., (976).
Cameron, I. G., 1011.
Carayon, A. & Dieng, J., 997.
Chabaud, A. G., 983.
Chakravarti, A., 955.
Chakravarti, H. S., 987.
Chand, D., (977).
Chardome, M. & Peel, E., 982.
Chaudhuri, R. N., Chakravarti, H & Dutta, B. N., (951) *bis*, 951.
Christophers, S. R., 1003.
Chun, D., (951).
Claessens, H., 935.
Čmelik, S., (976) *bis*.
Cohen, B. S., Meyer, L. M. & Fadem, R., 992.
Collignon, E., 1001.
Conn, H. C. & Greenslit, F. S., 980.
Coutelen, F., Gervois, M., Cochet, G., Biguet, J. & Mullet, S., 970.
Coutinho, J. O., Campos, R. & Amato Neto, V., 977.
Cseh Firtos, S., 927.

Dakshinamurty, S. & Sharma, M. I. D., 1001 *bis*.
Davis, W. M. & Most, H., 986.
Dawood, M. M., 970.
DeLong, D. M., Boush, G. M. & Lea, A. O., 1003.
Derryberry, O. M. & Gartrell, F. E., 930.
DeSa, A. E., 978.
Desowitz, R. S. & Watson, H. J. C., 936, (936).
Dias, J. A. T. S., (935).
Dierckx, F., 992.
Diethelm, L., Heuck, F. & Kloos, K., 978.
Diéz Rivas, F., Suárez, R. M., Hernández Morales, F. & Pérez Santiago, E., 991.
Dornoy, J. M., 996.
Dubois, A., 965.
Duncan, D., 929.
Dutta, N. K. & Narayanan, K. G. A., (992).

Elbel, R. E., (948).
Elton, N. W., 943.
Englesberg, E., 947.
Eyles, D. E., 936, 999.

Fabiani, G. & Vargues, R., (933).
Fain, A., 1005.
Faust, E. C., Agosín, M., Garcia-Laverde, A., Sayad, W. Y., Johnson, V. M. & Murray, N. A., 980.
Favorite, F. G., 948.
Fernández Nafría, A. & Hens Tienda, L., (969).
Ferreira, F. S. da C., (935).
Ferreira, T., (935).
Figueredo, N. & Desai, S. D., 966.
Floch, H., 968.
da Fonseca, F., 934.

Garcia Sanchez, F. & Suarez Torres, G., (945).
Georgopoulos, G., 928.
Gibson, C. L., 984.
Gilroy, A. B., 987.
Glorieux, E., (923).
Goble, F. C., 938.
Goeters, W., 985.
González Prendes, M. A., (964), (965).
van Goor, W. T. & Lodens, J. G., 930.
Gopalan, C., Venkatachalam, P. S., Rao, K. S. & Menon, P. S., 987.
Gürevin, I., 976.
Gurkirpal Singh & Ahuja, M. L., 949.

Hadaway, A. B. & Barlow, F., 1006.
Haedicke, T. A., Reagan, R. L., Schenck, D. M. & Brueckner, A. L., 966.
Hanks, J. H., 969.
Harrison, C. M., 1006.
Harrison, J. L., (941).
Hartzell, A., (1005).
Haseeb, M. A., 971.
Hawking, F. & Tburston, J. P., 931.
Heisch, R. B. & Guggisberg, C. A. W., (1005).
Helo, J. E., 957.
Hueck, O., (977).
Hughes, T. E., (983).

Innella, F., 960.
Innes, J. R., 963.

Jadin, J., 928.
Jaques, W. E., 979, (979).

Kalra, S. L. & Rao, K. N. A., 939, 940.
Kilpatrick, J. W. & Fay, R. W., 941.
Koenigstein, R. P., 974.
Komiya, Y. & Murase, K., 976.
Kuntz, R. E. & Wells, W. H., 973.
Kvittingen, J., 967.
——, Cutler, J. C., Guevara, J. A., McCullough, J. C., Rose, E., Ford, V., Tampi, R. B., Sen, S., Lakshwir, Khan, J. & Dass, P., 967.

Laarman, J. J., 953.
la Face, L., 1004.
Lampe, P. H. J., 964.
Lamy, L. & Lambault, E., 953.
Landtman, B., 985.
Lapi, A., Davis, C. L. & Anderson, W. A., 945.
Leite, A. S. & Ré, L., (996).
Lenczner, M. & Dubash, J., (957).
Levi-Castillo, R., (1003).
Liu, W. & Landauer, E., 939.
Lo Siauw Goen, 946.

McDearman, S. C. & Dunham, W. B., 954.
Macdonald, G., 1006.
Machado, H., (937).
Mackinnon, J. E., 994 *bis*.
McMahon, J., 984.
McRary, W. L., Noble, E. R. & Tondevold, E. L., 937.
Marques, R. J., 973.
Maxwell, J. L. & Kao, L., 963.
Mendoza, J. B., (927).
Miranda, J. R., (937).
Misao, T., Yamaoka, K., Yamada, Y., Ishihara, K. & Kimura, M., 944.
Miyazaki, I., (1002).
Mookerjee, G. C. & Ghose, B. K., (992).
Moyle, V. & Baldwin, E., (977).
Muirhead-Thomson, R. C., Gordon, R. M. & Davey, T. H., 1006.

Newcomer, V. D., Wright, E. T. & Tamblyn, E. E., 995.
Nikolic, M., 946, 947.
Nor Eldin, G. & Morcos, F., 927.

Omori, N. & Sakakibara, M., 924.
Otto, G. F., Brown, H. W., Bell, S. D., Jr. & Thetford, N. D., 982.
van Oye, E. & Charles, P., 992.

Pará, M., 972.
Parker, A. H., 1001.
Pätiälä, R. & Raekallio, T., (967).
Pavlov, P. & Georgiev, B., (1005).
Peltonen, T., 998.
Pérez Gallardo, F., Clavero, G. & Hernández, S., 938
Pesigan, T. P., 975.
Pinto, M. R., (943).
Pizzi, M., 962.

Continued overleaf

Pratt, H. D., (1002).
Puech, J., 1000.

Quinby, G. E. & Welch, S. F., 923.
Qutub-Ud-Din, M., 979.

Ramakrishnan, S. P., Young, M D., Jeffery, G. M., Burgess, R. W. & McLendon, S. B., 924.
Rao, C. K. P. & Krishnan, P., 997.
Reeder, W. H. & Goodrich, B. E., 997.
Remlinger, P., 945, 947.
Renjifo, S., Sanmartín, C. & de Zulueta, J., (935).
Rodhain, J. & Vincke, I., 932.
Romaña, C., (937).
Ross, G. L., Norcross, J. W. & Horrax, G., 973.
Roth, L. M., 943.
Roy, A. T., 968.
Rozeboom, L. E., (1002).
Ryckman, R. E., 937.

Saccà, G., (1003).
Safford, J. W., 945.
Salazar y Cruz, S., (964).
Schmidt-Hoensdorf & Holz, J., 1000.
Schujman, S., 968.
Sergent, Ed., 925.
—— & Poncet, A., 934, 959.
—— & Sergent, Et., 933.
Shaffer, J. G. & Washington, J. E., 956.
Shrum, R. C., Lanard, F. W. & Wilkerson, D. C., 927.
da Silva, T. L., 993.
Soper, F. L., 996.
Stijns, J., 975.
Suárez, R. M., 991.
Sultan, Z. M., (970).

Tanimura, T & Nishimura, S., 969.
van Tiel, N., 1009.
Tisseuil, J., 961.
Toda, T. & Nakagawa, Y., 944.
Trans. Roy. Soc. Trop. Med. & Hyg., 1006.
Traub, R., Wisseman, C. L., Jr. & Audy, J. R., 1006.
Turhan, B., 988.

Unsworth, K. & Nesbitt, P. E., (936).

van den Berghe, L., 982.
van der Hoeven, J. A., 981.
Venkat Rao, V., 924.
Vielle, A., 956.
Vives Sabater, J., (945).

Wade, H. W. & Ledowsky, V., 963.
Wahi, P. N. & Arora, M. M., 925, 926.
Walters, J. H. & Smith, D. A., 988.
Wanson, M., 1005.
Wardle, R. A. & McLeod, J. A., 1011.
Watson, J. M., 971.
Weyer, F., (943).
Whitfeld, P. R., 931.
Wilmot, A. J., Armstrong, T. G. & Elsdon-Dew, R., 956.
Winckel, C. W. F., 927.
Wirth, W. W., (1003).
Womersley, H., 942.
World Health Organization, 949.

Ybarra Pérez, R. & González Prendes, M. A., 965.
Yoeli, M. & Wall, W. J., 932.

Zarzycki, J., 986.

Publications issued by the
BUREAU of HYGIENE and TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

containing classified summaries of current papers and reports from the medical and scientific publications of the world on diseases of the tropics and warm countries and the problems of their scientific control.

(*Issued Monthly, now in* Vol. 49)

BULLETIN OF HYGIENE

containing abstracts of current medical literature on public health administration, social services, communicable diseases, sanitation, nutrition, industrial hygiene, bacteriology and immunity, and related subjects of public health interest.

(*Issued Monthly, now in* Vol. 27)

The papers chosen for abstracting in these *Bulletins* are selected by the editors from the medical literature of the world. The abstracts, written by distinguished contemporary scientists who have a special knowledge of the various subjects dealt with in the original papers, are designed to convey up-to-date information, classified and appraised, to members of the medical profession and research workers throughout the world.

Subscription rates for *Tropical Diseases Bulletin* and *Bulletin of Hygiene*: 70 shillings per annum post free (for each *Bulletin*). Single numbers 7s. 6d. each.

ORDERS and SUBSCRIPTIONS may be sent direct to the

BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street,
Gower Street,
London, W.C.1

or through any bookseller.